The Farm

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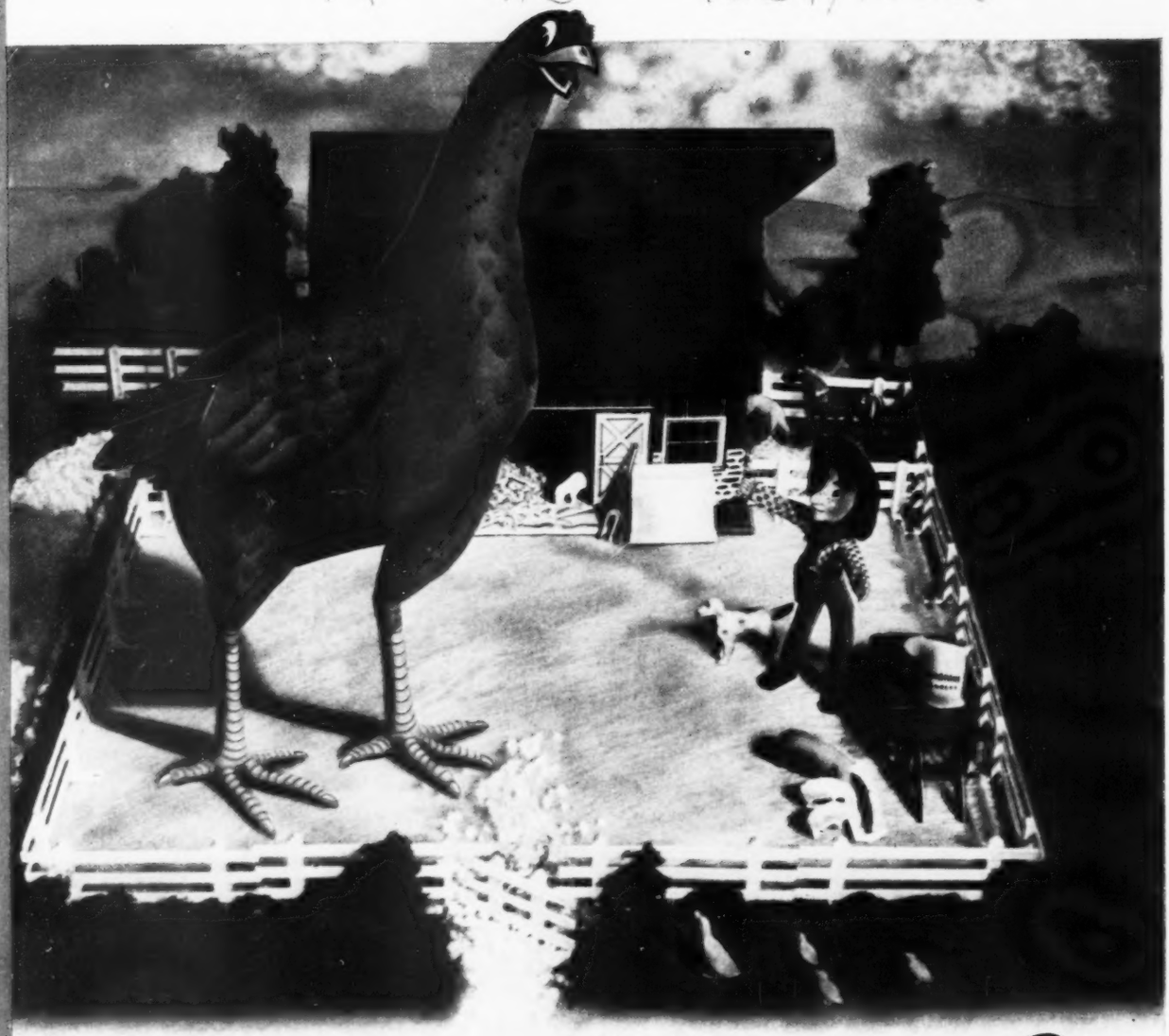
How to buy a farm

R v.6 1951/1952



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CULTIVATING

Heavyweight Champ, Indiana state tractor-pulling contest, 1950

pull the biggest loads

because the Chrysler Gýrol Fluid Drive permits maximum engine power to be delivered gradually to the draw bar without tire or clutch slippage.

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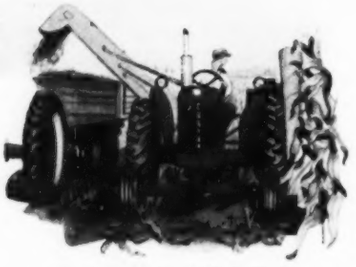
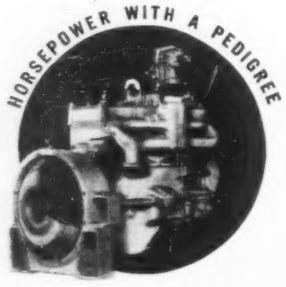


HARVESTING



Manufacturers of 2, 3, and 4 plow Tractors and Farm Implements.

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You can SEE why Firestone CHAMPIONS Beat them all!

Look at all these EXTRA FEATURES!

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Only Firestone gives you all these extra features. Only Firestone gives you your choice of top quality in either Open Center or Traction Center design. So, before you buy, LOOK!

ALWAYS BUY TRACTOR TIRES BUILT BY FIRESTONE, ORIGINATOR OF THE FIRST PRACTICAL PNEUMATIC TRACTOR TIRE

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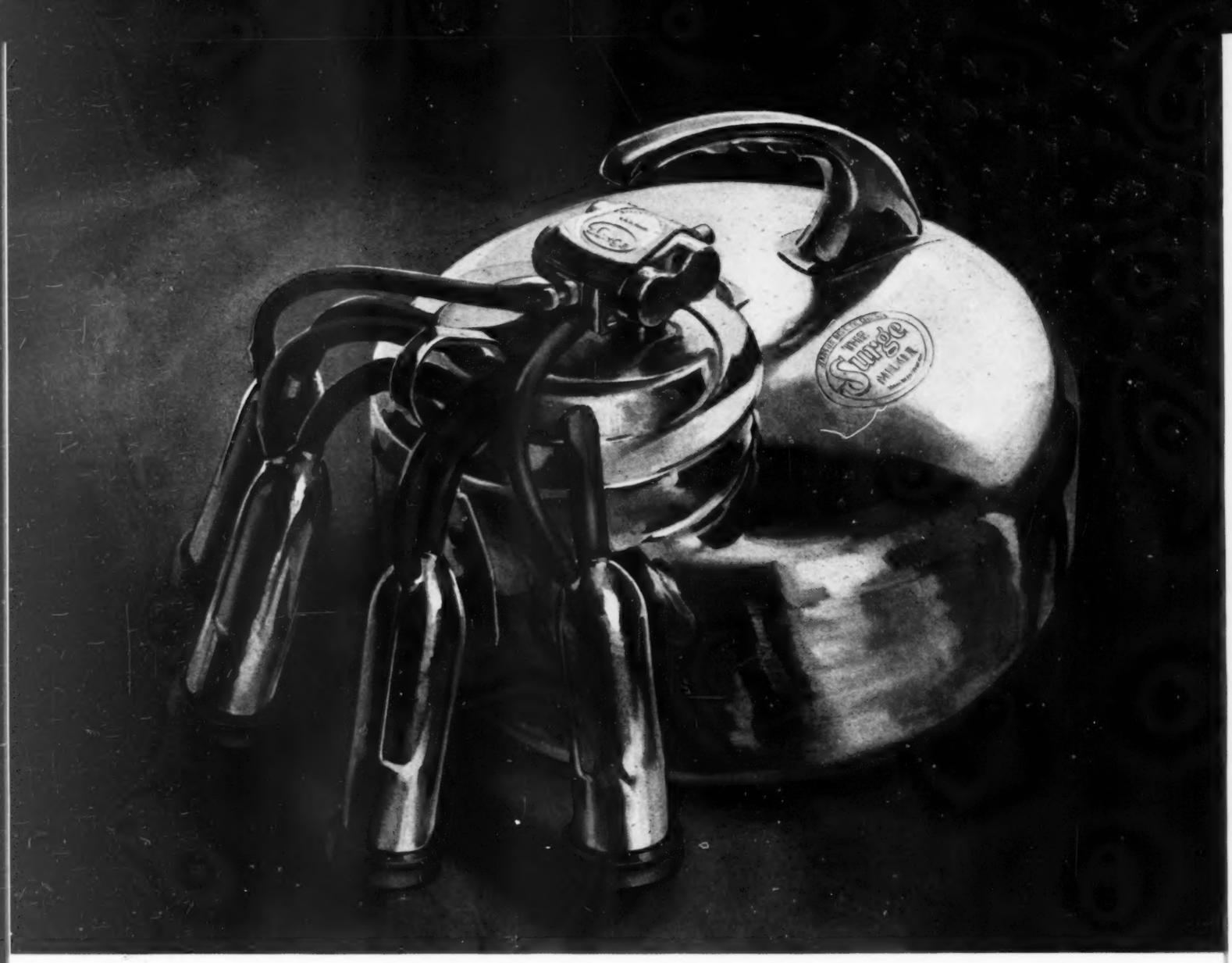

No calf, no man and no machine can do a safe, complete and satisfactory job of milking cows without TUG & PULL.

That's one of the big reasons why—in 1950—more thousands of farmers than ever before* switched to Surge. Not just more farmers but more *thousands* of farmers.

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COMING IN SUMMER

With industry mobilized for war, farmers are again faced with the probability of making their tractors last for the duration. The Summer FARM will publish a story on how to get extra mileage out of farm machinery. Other stories which will get down to the business of war time production are, "How to Produce Grade A Milk", "Pig Hatchery", and "Pit and Trench Silos".

John and Mary Collier, who did our story on the Indians of Peru, will collaborate again on the farmer-fishermen of the Gaspe peninsula of Canada. Other features will be "The Last of the Buggy Factories", and "Grandpa's Tools", a picture survey of the development of machinery in the last half century.

C. M. Long, a popular contributor, will reveal the results of years of study and practice on how to select, buy, manage and feed cattle for all types of farms. Mr. Long will stress the value of grass and the tricks for making profits.

The production of goat milk is gaining more and more attention around our larger population centers. "The Goat Dairy" will take you on a visit to a New England farm where 150 milk goats produce milk checks for $12,000 a year.

The modern veterinarian, that overworked person who is so necessary to the farmers' welfare, will be taken around his circuit on a typical day's work. You'll read what the veterinarian thinks farmers should do about preventing mastitis and the other diseases that take the profit and pleasure out of livestock raising.

How the hatching dates of the Hessian Fly are computed and other controls of this wheat-field pest will be described in a crop article. The cost, maintenance and history of fences, and "The Skunk, Friend to Man," are in the Summer line-up. Two timely questions, "What is APF and what are the actual values of synthetic feed supplements"? and "How does Production Credit Work"? will be given a thorough airing in the Summer issue. Added for good measure are two conservation articles on how a Conservation District is organized and what it does for the farmer, and another which reviews all important western range grasses.

The Summer FARM will be as big and as nourishing a cake as we have put out in a long time; and the frosting will be especially tasty.

THE FARM QUARTERLY
22 East 12th St., Cincinnati 10, Ohio

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George Laycock.....**Associate Editor**
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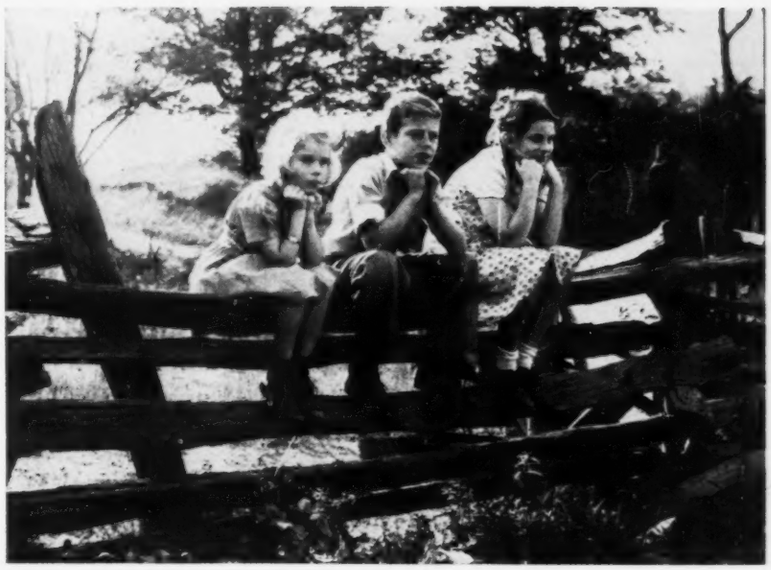

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More than replaces summer pasture...

SOWS FARROW LARGER, heavier, stronger litters in the fall because the sow has had the benefit of summer pasture. Pigs grow faster, bigger, better when they have more of the nutrients of summer pasture!

And now you can get summer pasture results all year 'round! In fact, add Semi-Solid Pig and Sow Emulsions to your winter feeding plan . . . and you'll *more* than replace summer pasture. Semi-Solid Pig and Sow Emulsions contain the minerals and Vitamin A of grass, the Vitamin D of summer sunshine *plus* the healthful B complex factors of milk (including APF) which the finest summer pasture can't supply!

So, no matter what else you feed—feed Semi-Solid Pig Emulsion to your pigs that were born this fall. Feed Semi-Solid Sow Emulsion to your sows that will farrow this spring! See what a big change in your profits this one change in your feeding plan can mean! Get Semi-Solid Emulsions at your feed store today.

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On just 40 acres you can feed and raise 1,000 top weight hogs every year with the new Semi-Solid System. Write for free plans, blueprints, and information on this amazingly successful system of raising hogs. No matter how few your hogs—or how many—the Semi-Solid System can increase your profits. Send postcard to: Consolidated Products Company, Dept. FQ-S, Danville, Illinois.

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"$20 MORE SEED FROM EACH ACRE"

"WE OPERATE 3 COMBINES—THE CASE GETS MORE SEED WITH LESS CRACKING."—JAS. H. SIMS

"IT SURE SAVED OUR CROP—COMPLETELY COVERED WITH RAGWEEDS 3 FEET HIGH."—PAT HARSHA

● "We pulled into a field of heavy-yielding Reseeding Crimson Clover where another make of combine with 7-foot cut had been combining. They had harvested 3,000 pounds of seed the previous day — something of a record for that neighborhood. Our 6-foot Case 'A' combine worked three full days and averaged 3,400 pounds per day. Since we combined very little faster than the 7-foot machine, we could only conclude that the Case combine was getting more seed per acre, leaving less seed in the field. With clover seed selling for nearly 50 cents a pound, our Model 'A' combine harvested at least $20 more seed per acre."

—Frank French.

AMERICA'S FAVORITE COMBINE SAVES ALL THESE CROPS

Wheat	Carpet Grass
Oats	Red Clover
Rye	Sweet Clover
Barley	Alsike Clover
Rice	Crimson Clover
Buckwheat	Reseeding Crimson Clover
Soybeans	Ladino Clover
All edible beans	Ala-Lu Clover
Lespedeza	White Dutch Clover
Alfalfa	White Clover
Peas, all kinds	Subterranean and other clovers
Vetch	Onion, Cabbage, other vegetable seeds
Blue Lupine	Flower Seeds
Birdsfoot Trefoil	Flax
Peanuts	Popcorn
Timothy	Kaffir, Milo, and other sorghums
Rye Grass	Safflower
Millet	Sunflower
Brome Grass	Hairy Indigo
Orchard Grass	...and many more
Fescues	
Red Top	
Bluestem	
Dallis Grass	
Rescue Grass	

BIG CAPACITY COMBINES FOR BIG-ACREAGE GRAIN GROWERS

For the smaller farm there is the low-cost 5-foot "F-2" combine — just right for power-take-off operation with 2-plow tractors. Case also builds hillside and rice combines. Whatever your crops and acreage, see your Case dealer —make plans now for getting the model that fits your operations.

Case Self-Propelled combines, built in 9 and 12-foot sizes, have a variable-speed traction drive. Without stopping or changing gears it adjusts the field speed over a wide range to suit crop conditions, permits operation always at correct capacity. Equipped with Case tractor engines for steady, dependable power. Hydraulic header control is engine-driven — independent of traction and threshing mechanism. Choice of rub-bar or spike-tooth cylinder.

Case 9 and 12-foot pull-type Models "M-2" and "K-2" share many features of the Self-Propelled—auger-type header, full-width feeding by undershot rake, rub-bar or spike-tooth cylinder, lever adjustment of concave clearance. Long straw rack spreads straw thin for fast separation. Conveyor-type grain pan. Air-Lift cleaning — balanced air pressure under sieves holds chaff up, keeps openings clear, lets kernels fall free and clean.

CASE

FIND OUT WHAT YOU, TOO, STAND TO GAIN

Get latest catalog or folders. Mark machines that interest you; write in margin any others you need. Mail to J. I. Case Co., Dept. C-90, Racine, Wis.

- ☐ 6-ft. "A" combine
- ☐ 5-ft. "F-2" combine
- ☐ Self-Propelled combines
- ☐ 9-ft. "M-2," 12-ft. "K-2"
- ☐ Windrowers for grain and seed crops
- ☐ Low-cost "VAC" tractor —Latch-On implements
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2 in 1 Chrome Piston Ring Set!

TOP COMPRESSION RING
Plated with Solid Chrome
NEW CHROME OIL STOPPER
Optional HiPressure spring packed with every Chrome Oil Stopper, for use in badly worn engines —at no extra cost!

IT'S A FACT! The new 2-in-1 Chrome Piston Ring Set is actually *two sets in one* . . . because solid chrome plating on the top compression ring and the steel rails of the oil ring assures *twice the life* of ordinary sets!

YES, Perfect Circle's 2-in-1 Piston Ring Set establishes a new high standard of piston ring performance, even in heavy-duty, dusty service. Whether cylinders are slightly or badly worn, tapered or straight, round or out-of-round, the new 2-in-1 Chrome Set provides genuine oil economy and sustained power for thousands of extra miles.

YOUR DOCTOR OF MOTORS, your favorite mechanic, will respect your judgment when you request him to install a new 2-in-1 Chrome Piston Ring Set in your car, truck or tractor. Or, if you do your own maintenance work, you'll find the 2-in-1 set gives improved performance in every installation.

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The Most Honored Name in Piston Rings

LETTERS

THE BRAHMAN'S COMPETITION

Sir:

The article, "The Brahman Crosses," by S. A. Goddard (Winter 1951) was obviously colored, and contained many unsubstantiated statements and half-truths which I intend to point out below. There is one statement, repeated several times, in various forms, that "range cattle producers in the United States and Canada are mighty concerned over what they call "the deterioration" which our beef breeds have undergone in the past two decades. I know a great number of range cattle producers in the United States, and am associated with them continuously, and am one myself, and I have *never* heard a single one of them express this concern that Mr. Goddard speaks of. In fact, when the subject arises, the general concensus of opinion is that the Hereford breed has made great strides in the last half century.

A gross misapplication and misinterpretation of isolated figures is basically the gist of Mr. Goddard's wholesale attack on Hereford cattle and the other standard beef breeds. There are probably twenty times the number of Hereford registered and commercial cattle in the United States than there are of all Brahmans and their crosses. And yet, with a blank face, Mr. Goddard proposes to compare the average Hereford with the very top quality Brahman.

I have enjoyed the rest of your winter issue for 1951, but in all fairness to the Hereford breed and the other standard beef breeds, you should solicit an article which will point out the strides they have made and the quality they are now offering the packer and the range man.

Irwin Mann, Jr.
Double M Hereford Ranch, Stanfield, Oregon

Mr. Goddard obviously has no axe to grind. He traveled 8,000 miles to gather data for the Brahman article. The FARM gave Herefords a day in court in the Autumn, 1948, issue.

* * *

DOUBLE CHECK

Sir:

I wish to call to your attention that Johann Gregor Mendel was not a Moravian monk as is stated in the fourth paragraph of the article "Blue Tag Seed," in the winter issue.

Mendel was a Roman Catholic Augustinean Monk that lived (1822-1884 of the house of St. Thomas, at Brunn, Austria, of which he eventually became Abbot. (Check any text book on science.)

Leo Bradsaw
Greensboro, North Carolina

Our reference to Mendel as a Moravian monk was geographical, not ecclesiastical. Brunn is the capitol of Moravia (check any textbook on geography).

* * *

IRRIGATION NEEDED IN AFRICA

Sir:

I know of the tremendous amount of overhead irrigation which is carried out in the

Powerful Super-Feed Helps...

MAKE HOGS OUT OF RUNTS

1. Peps up Poor Appetites
2. Speeds up Slow-Growers
3. Stimulates Poor Milking Sows
4. Easy to Feed —No Mixing

FORTIFIED with VITAMIN B^{12} and ANTIBIOTIC FEED SUPPLEMENTS *Plus* *Special High Potency Ingredients*

WAYNE TAIL CURLER

DOES SO MUCH! COSTS SO LITTLE!

BEFORE: These runty, uneven pigs had little or no appetite and gains were at a standstill when they went on test at the Allied Mills Research Farm.

AFTER: Lower photo shows same pigs after gaining 28.2 lbs. in 30 days on Wayne Tail Curler. They ate 2.07 lbs. of feed for each pound of gain! Pigs on a standard pig ration gained only 5.7 lbs. each during same period, eating 4.4 lbs. feed per lb. gain.

Don't delay! Get your runts and slow-growing pigs on Wayne Tail Curler *now*...see for yourself how this super-feed is *packed with power* to do more for them than you ever thought possible.

Wayne Tail Curler combines the benefits of "Ingredient Quality," PLUS "Ingredient Balance"...with special ingredients *matched and meshed* to release *super feed-power* and appetite appeal not possible in ordinary rations. *And yet it costs less than many pig feeds!*

Backed by exhaustive Allied Mills Research Farm studies, Wayne Tail Curler stands ready to help YOU *make hogs out of runts!* See your Wayne Dealer at once—or send coupon.

SEE YOUR WAYNE FEED DEALER NOW...OR RUSH COUPON BELO

ALLIED MILLS, INC.,
FORT WAYNE 1, INDIANA, Dept. (FQ) Date

Send me full information and simple feeding guide on Wayne Tail Curler. I raise about hogs a year.

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(Address or R. F. D.)

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World famous Ignition Engineered Auto-Lite Transport Spark Plugs are designed especially for tractors and heavy-duty equipment . . . and are specified as original factory equipment on many leading makes of trucks and tractors. Rugged and built to take it . . . at idle or heavy pull . . . Auto-Lite Transport Spark Plugs help farmers get best performance and longer spark plug life . . . give farmers outstanding and exclusive features.

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Give long gap life which contributes to lower service costs by requiring less frequent regapping.

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Especially suitable for the most severe farm operation.

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MONEY CANNOT BUY A BETTER SPARK PLUG!

United States, and I am extremely interested in securing further information on this subject—not from manufacturers' catalogues, useful though they are; and not only from official publications reporting the results of experiments, valuable although these may be; but also from the practical farmer who has achieved results that put into his pocket an extra large check—the acid test of its successful operation.

I should be very interested in hearing from any farmer who cares, and has the time, to write to me of his results; and, especially, *how* they are achieved.

There are conditions where water is extremely scarce; and a scientific application of even a minimal quantity at the right time will give a far larger crop than would be obtained without irrigation.

For potatoes, a small extra yield for a large additional amount of water would not be economical; but it might pay for strawberries, asparagus, and similar luxury crops with high market values.

There are many effects of irrigation which growers have noticed. It is believed that irrigated plants, growing more strongly and more rapidly, are more resistant to pests and disease. It is believed that overhead irrigation reduces windfalls in orchards, possibly by keeping the stems more pliable. Washing the leaves with overhead irrigation possibly removes dust and allows increased aspiration; but if the trees have been sprayed, this irrigation might wash away the chemical.

Some growers feel that fertilizers and insecticides can well be applied to all crops with the overhead irrigation system; others say it costs less to distribute fertilizer by hand and to use the sprinkler to wash it into the soil. What are the facts?

If any of your readers would be good enough to give me information on any of the points mentioned in this letter, from their practical experience, I should be very grateful indeed. I know of the generous willingness of the American farmer to co-operate freely on giving others the benefit of his knowledge.

E. Fleming
P. O. Box 1118, Pretoria, South Africa

* * *

POET'S DEPARTMENT

Sir:

Suggest you have more on growing and marketing tobacco, because you see:

We have a little rusty barn
'Tis scaffolded from within
We hang tobacco on its rails
Like chickens on a limb.

Irvin Salyer
Adams, Kentucky.

* * *

OUR FISH STORY

Sir:

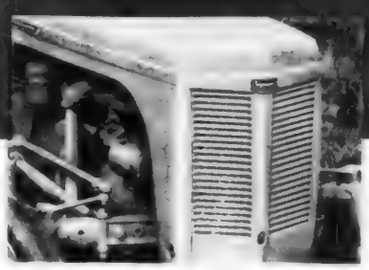
I just read the article Ice Fishing in your magazine and I have never read as much misinformation in any one paragraph before. It states, "If he lives in Minnesota he may want a shelter but the law says this is illegal for line fishing." This is not so. We may have a shelter for line fishing but the shelter must have a window open to the light or we may fish with the door open. That way the fisherman cannot see the fish. One can only see the fish clearly if there is no light coming into the house.

It also states, "The best way to spear fish is to lie flat on the belly with the eyes near the surface of the water in the hole. I'll challenge the writer of this to try doing this for six hours or more. The best way to spear fish is to sit by a warm stove, have it totally dark in the house and take your best friend along and have him fry the bacon and eggs for dinner while you, very optimistically sit on a good soft cushion and wait for the big one to come in.

Arthur Overby
Wolverton, Minn.

Did you ever hear fishermen agree on anything? Ed.

A Combination of POWER and PERFORMANCE that's NEVER BEEN EQUALED!



This is the "up-front look" of the Ferguson Tractor with the *complete* Ferguson System. Here, too, is the powerful valve-in-head engine that gives you lugging power to spare.

Here's the *only* one-man, one-tractor combination that lets you handle tons of manure easily, quickly, *without leaving the tractor seat!* It's the efficient new Ferguson Manure Loader and the Ferguson Spreader.

No matter how similar to the Ferguson any other tractor may be—in design, appearance or function—*not one* has been able to *completely* duplicate the amazing performance of the revolutionary Ferguson Tractor!

Ferguson's "engineered" combination of its specially designed valve-in-head engine *with* the greatest agricultural achievement of this era—the Ferguson System—is the big reason! To this combination, add the high Ferguson standards of quality and you have the most logical reasons in the world why *your* next tractor *should* be a Ferguson!

The Ferguson System is more, *much more* than just a hydraulic lift . . . much more too, than a 3-point implement hitch. It is a *completely integrated* system of manually and automatically controlling Ferguson unit-mounted implements in operation in the ground. The Ferguson System virtually *thinks* for you! Automatically, it changes the Tractor's weight to suit the job—yes, actually *increases* traction, too, for the heavier jobs!

There are so many advantages to the *complete* Ferguson System that you owe it to yourself to get the full story. Of course, the *best* answer is a Ferguson "Showdown" Demonstration right on *your* farm. See your friendly Ferguson Dealer *now,* or mail coupon below for more information.

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AND FERGUSON SYSTEM IMPLEMENTS

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NAME.....

ADDRESS.....STATE.....

SIZE OF FARM.....COUNTY.....

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Only Bolens Power-Ho DeLuxe Garden Tractor gives you:

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MODEL 31-A HEAVY-DUTY DUMP WAGON
Built-in, tractor-power operated, hydraulic hoist for quick, safe, easy dumping. Capacity 4½ ton max.; 7 ft. x 12 ft. platform. Attachments available for 150 bu. grain-tight box, 42" stake rack, stock rack, hay rack, chopped hay extensions and gate. Automotive type steering; roller bearing wheels.

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The Dairy Barn

A BRIEF SUMMARY OF THE NEWEST DEVELOPMENTS IN DAIRYING AND THE CARE OF DAIRY CATTLE.

More Feed More Milk If a cow could be induced to eat more feed, would she produce more milk? This possibility has occurred to many dairymen who have had a go at stuffing Bossie, but with indifferent success. A cow is an opinionated, stubborn beast and when she has had all she wants to eat she calmly lies down, chews her cud, and makes milk. It's difficult to change her habits.

The Danes, those ingenious people who occupy that thumb of land which juts northward from Germany, have been highly successful in getting more feed into the front end of a cow and taking more milk out of the back end. The Danes have a small country and have learned how to get maximum production from their land as well as their animals. They have been supplying a good portion of western Europe with breakfast ingredients, butter, milk, cheese, and bacon, for a long time. Their animals are good and they know how to get the best out of them.

Three years ago, after a ten-year study, the Danish government selected two herds for an experiment in feeding large quantities of highly concentrated feeds. One of the herds, that belonged to the Reimann estate at Stensbygaard in Zealand, was made up of highly bred, registered animals; the second herd, owned by Count Wedell of Wedellsborg, was a good general farm herd. Professor L. Hansen-Larsen head of the cattle department of the Danish Laboratory for Agricultural Research, who proposed the experiment, felt that valuable information would result from following the same procedure on two very different types of animals.

The duration of the experiment decided upon was a period of 365 days after calving—in other words, a lactation period of a year.

It was realized that special attention would have to be paid to feeding, care, and milking and that controls during the experiments would have to be very thorough. They therefore agreed that the cows should have coarse food consisting of as good and well-stored feeds as possible. This should be supplemented with such large quantities of any appetizing and nutritious mixture of concentrates as the cows could consume without adverse affect on the health.

The cows were to be fed four times a day and they were to be induced to eat as much as possible. During the dry period of each cow, from 2½ to 3 months before she freshened (the tests began a few days after freshening), she was fed with

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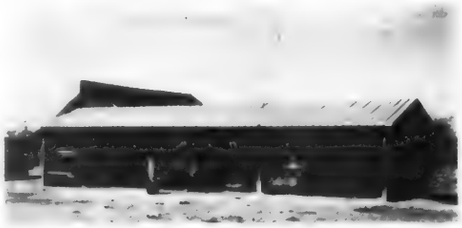
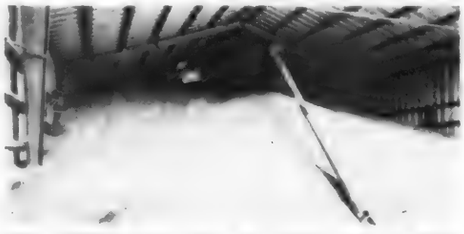
DAIRY BARN--Plenty of space in Butler Buildings to install complete equipment for a modern, well-ventilated, up-to-date milking parlor.



IMPLEMENT SHELTER—Butler open front Utility Building protects valuable farm equipment . . . can be used for many other purposes.



GRAIN STORAGE—Photo shows full usable space of Butler Building, specially designed for grain storage. No shoring or cribbing needed.

FEED STORAGE and CATTLE BARN—Two farm storage and shelter needs are served by one Butler Building. Note specially constructed lean-to.

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Make permanent farm improvements now—*and save*—with Butler Steel Buildings.

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an increasing ration to get her into condition and accustom her to the extra heavy ration which she would receive when she went on test. To induce her to eat more and more feed, she was offered the feeds she liked best. Her appetite was wooed with all the tasty things a cow eats — the more she ate — the more her rumen stretched; the more her rumen stretched, the more she ate. The goal of these experiments was simply to determine if a cow could be induced to eat more with a resulting increase in production. The costs were not to be a factor in the study.

Conditions in the cow-shed were to be the best possible, well insulated so that by vigorous ventilation the air inside would be fresh at all times, and a suitable temperature could be maintained. The cows were to be kept in spacious stalls or loose in box stalls, and were to be warm and comfortable with plenty of bedding.

It was appreciated that milking would be very important. They therefore decided that it should be done four times a day at intervals of exactly six hours by efficient and well-trained hand-milkers. Since the value of experiments like these depends to a great extent on their accuracy, the assistants appointed by the Laboratory for Agricultural Research were instructed to observe the greatest care. At Stensbygaard it was possible to record the milk from each cow by weighing after each milking and to determine the fat percentage in samples of all the milk. At Wedellsborg the milk from the individual cows was weighed four days a week and the fat percentage determined in samples of the weighed milk.

The feed given to each cow was weighed and any leavings deducted. Apart from the grass that was eaten, exact information about the amounts of food consumed was available at the conclusion of the experiment.

Experiments At Stensbygaard

Average Yield of dairy cows at Stensbygaard

Financial Year	1923-24	1948-49
Number of cows	119	119
Milk, in lbs.	6,035	13,748
Fat percentage	3.44	4.42
Butter fat, in lbs.	208	607.1

The herd at Stensbygaard has been built up by the present owner since 1925, using older progeny tested bulls. As the figures above will show, it was a very ordinary herd in 1923, though it is now one of the best pure-bred herds in Denmark.

It is not only in yield that it is a good herd. In the keen competition of Danish dairy shows, the cows in the herd have taken numerous first prizes.

From this herd were selected 10 cows whose yield, age, and health made them appear well suited to the experiment. All the cows had given above 595 lbs. of butter fat—one gave 816 lbs.—per year in one or more years.

The test cows were put up in a former

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Each tube contains 100,000 units of PENICILLIN *plus* 100 mg. of DIHYDROSTREPTOMYCIN

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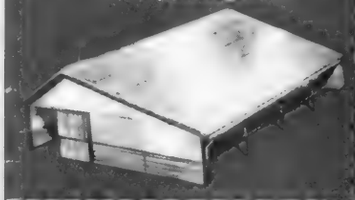

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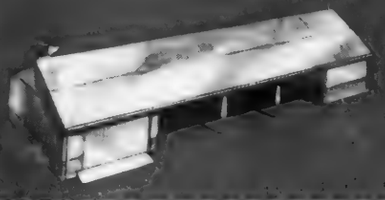

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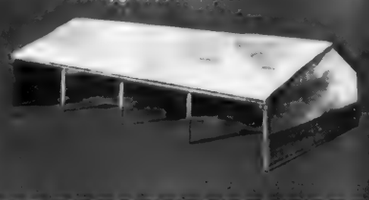

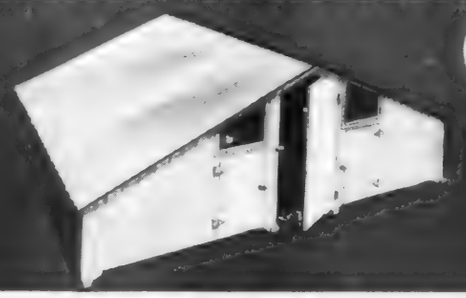

4 New! PORTABLE HOG FARROWING HOUSE AND SHELTER

This 2-section, 4-sow farrowing house is easy to build. Approximately 15'x20' in size, design saves both labor and material. Sides panelled for farrowing. Center alley for feeding, watering. Alley gates and partitions removable so that sections can be separated for summer shelter and shade. Sections movable through standard farm gates.

ALUMINUM MAKES THIS HOG HOUSE EASIER TO MOVE... AND COOLER INSIDE, SO HOGS GAIN MORE WEIGHT ON LESS FEED!

Tests prove hogs take much less feed per hundredweight gain if protected from severe heat...just as poultry and dairy cows produce more. Aluminum-roofed buildings reduce inside summer temperatures up to 15°...keep buildings warmer in winter, too! You pocket the difference in dollars!

This hog house is easy to build, rust-proof without painting, light to haul. For shelter and farrowing...it's a year-round operating tool. Like all the buildings shown it was developed by Doane Agricultural Service, built and approved by farmers.

Plans referred to below include in each case detailed erection instructions, sources of treated poles, and list of materials.

Reynolds Metals Company, Building Products Section, Louisville 1, Ky.

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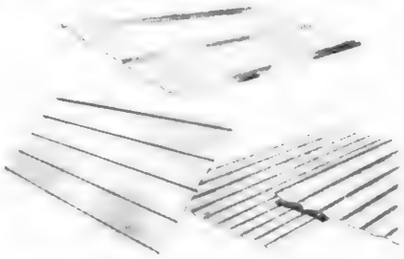

High-strength, precision-made sheets that lap snugly for extra weathertightness. Ask your dealer, too, for Reynolds *Lifetime* Aluminum Gutters, Downspouts, Reflective Insulation, Aluminum Nails.

Reynolds also serves the farmer with Aluminum Cable (ACSR), Portable Irrigation Pipe, Siphon Tubes, Paint Pigment, Reynolds Wrap and Freezer Foil.

FARM INSTITUTE

Plans for the Barn (1) and Machinery Center (2) shown at top, $5 each; Livestock Shed (3), $2; Hog House (4), $3. Further descriptive literature free. Check by number on the coupon.

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8000 ACRES—and still going strong! Shown above is Myron C. McGraw, Taylor, Nebraska, who says: "This is my 4th season for using my NEW IDEA Mower and I have cut approximately 8000 acres of hay—mostly native upland grass which is 5 times as tough as alfalfa. I plan to make my next mower another NEW IDEA."

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You're sure of cleaner, more even cutting on any kind of ground. This compact, whip-resistant mower trails straight and true—over ruts, chuckholes, valleys or mounds alike—with its full weight balanced on heavy but free-rolling wheels.

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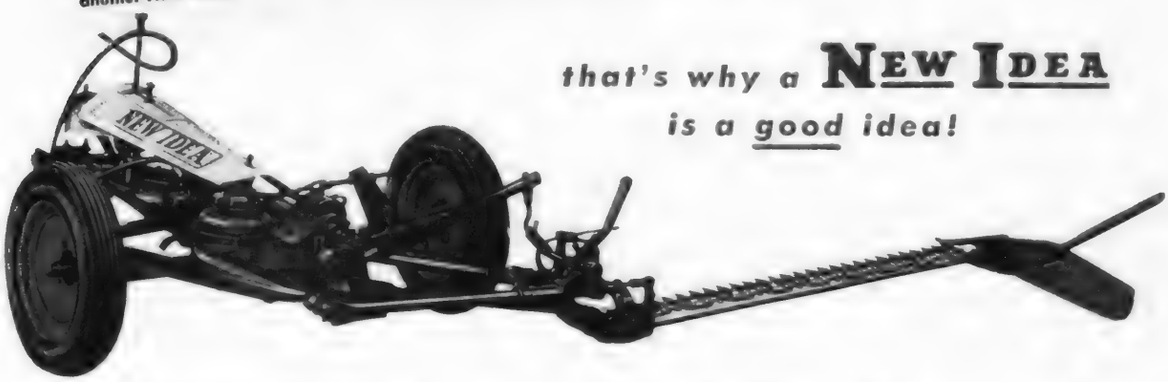

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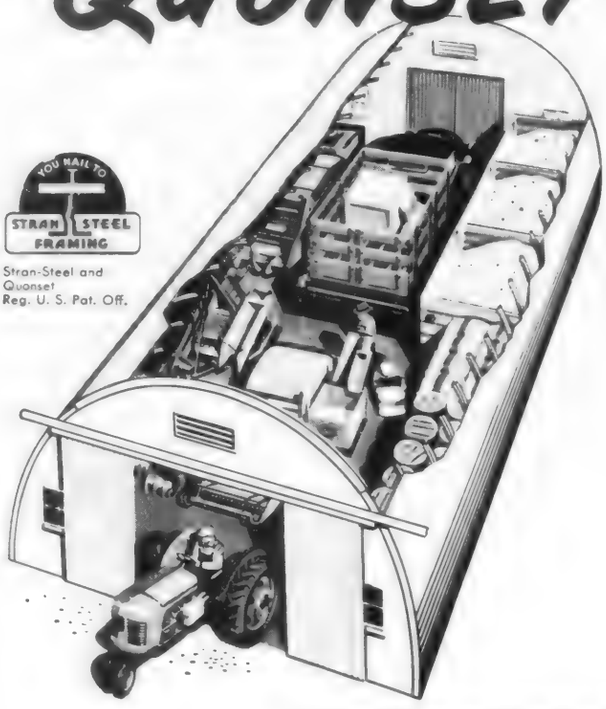

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All over America, farmers of all kinds—in every section of the country—are ready to back up statements like this because their *experience* with Quonsets has proved the Quonset's real *value* as a farm building.

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horse stable with six large, completely separated stalls and four spacious box stalls. In proportion to the number of animals there was plenty of room in the building. It was bright and well ventilated, and the 10 cows proved that they could warm it to a suitable temperature without difficulty. The temperature aimed at was 14-15° C.

There was plenty of room inside the building for storing both sugar beets and silage, thus enabling these to be fed in a tempered condition. The beets were washed and cut before feeding. The silage, made from young grass and clover with the addition of A. I. V. acid, was of first-rate quality throughout. The hay used was made from early-mown alfalfa of good quality. In the first winter of the experiment, up to 18 lbs. of red carrots were given daily to each cow, but since the cows did not care much for carrots, they were omitted the second winter.

In the summer of 1948 a proportion of wet sugar-beet pulp was given. For periods between the end of April and October the cows were also able to graze on good pasture where at times there was a considerable quantity of white clover.

Throughout the period of the experiment an evenly mixed concentrated feed was used, made up of 66 lbs. of prepared oil-cake mixture, 31 lbs. of coconut cakes, 55 lbs. of oats, 24 lbs. of sprouted malt, 22 lbs. of wheat bran, and 22 lbs. of molasses feed (50 per cent molasses).

This mixture contained 16 per cent digestible true protein. The cows liked it, and so little change was made in its composition during the entire period of the experiment. The prepared oil-cake mixture consisted of 10 per cent soybean meal, 25 per cent shelled cotton-seed cake, 20 per cent shelled sunflower cake, 20 per cent coconut cake, 20 per cent linseed cake, and 5 per cent molasses.

The period of the experiment extended for 365 days after calving, as already stated. But because all the cows did not calf at once, it could not begin or finish at the same time with all of them. The first cow calved on December 19, 1947, and the last on April 26, 1948.

All the cows were in their best age. The youngest was just over five years old, the oldest just under nine. They were over medium size, and a few may even be classed as very large. Their weight ranged from 1,312 to 1,726 lbs. The milk and butter fat yielded by these cows in the 365 days after calving are shown in the table below, which also gives the amount of gain in weight in the same period.

Yield during the Experiment

Cow Number	Milk lbs.	Fat percentage	Butter fat lbs.	Gain of cow lbs.
187	25,754	4.62	1,189	121
272	21,583	4.31	930	207
155	23,505	4.41	1,037	183
218	20,379	5.10	1,039	86
255	25,825	4.38	1,130	170
242	19,833	5.30	1,051	44
279	24,427	4.37	1,068	134
294	20,900	4.81	1,006	139
177	21,607	4.63	1,001	183
178	18,281	4.70	855	302
Average	22,200	4.64	1,031	157

A high yield was achieved with most of these cows. Cow No. 187 unquestionably holds the Danish record for butter production. Calculated according to the method generally employed,

$$\frac{(\text{milk} \times (\text{fat percentage} - 015) \times 100 = \text{butter})}{86}$$

her yield was 1,338 lbs. of butter.

All the cows increased in weight, most of them rather considerably. No. 178, which gave too little milk, put on over 300 lbs. in the 365 days. She was the lowest in production—her feed went the wrong way.

On the average, the cows consumed the following quantities of food: 4,053 lbs. of oil cakes, 4,775 lbs. of other concentrated food, 17,890 lbs. of roots, 4,870 lbs. of silage, and 2,335 lbs. of hay.

(Continued on page 139)

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You'll make leafier hay . . . handle every haying job faster and at lower cost with modern John Deere Equipment.

The John Deere Forage Harvester chops the windrowed crop in a fast, cost-cutting trip to streamline your haying and beat the risks of bad weather. Waste in feeding is reduced because stems and stalks are cut to "bite size" and mixed with the leaves—livestock eat *all* the hay. Fast-working team-mate of the Forage Harvester is the No. 50 Forage Blower, which speeds your chopped hay to storage.

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Packed with mineral-rich leaves and succulent blossoms, green-cut forage is a protein concentrate in itself. Protein often exceeds 20 percent in legume or grass silage made with the Allis-Chalmers Forage Harvester.

Here's your answer to rain spoilage of hay. Harvest standing green forage, save it *all*, with your own wide-throated, big capacity Forage Harvester and 2-plow tractor.

Power takes the crop all the way from field to silo. The Forage Harvester's power-saving, cup-shaped knives are spiraled to give an easy-shearing, cut-and-throw action that delivers clean-chopped forage to a trailing wagon. A new rear bumper attachment permits easy rear loading into trucks.

Now you can follow the ideal soil-building system, with more legumes and grass, more high-carotene feed, longer lactation life for your cows. To livestock, to your land, and to you, the Allis-Chalmers Forage Harvester can be the most welcome machine on the farm.

FORAGE HARVESTER

3 harvesters in 1

Three attachments for the Forage Harvester include: 1. A reel and sickle for green standing crops, or clipping pasture and stubble. 2. Pick-up attachment for dry hay, wilted hay or straw in the windrow. 3. A row crop unit for corn silage or sorghum.

Built-in knife sharpener

Cupped knives are power-honed by a sliding carborundum stone, without being removed from machine.

4-way auxiliary motor

Available for use with smaller tractors. Inexpensive attachments permit interchanging motor with Forage Harvester, ROTO-BALER, ALL-CROP Harvester, Blower.

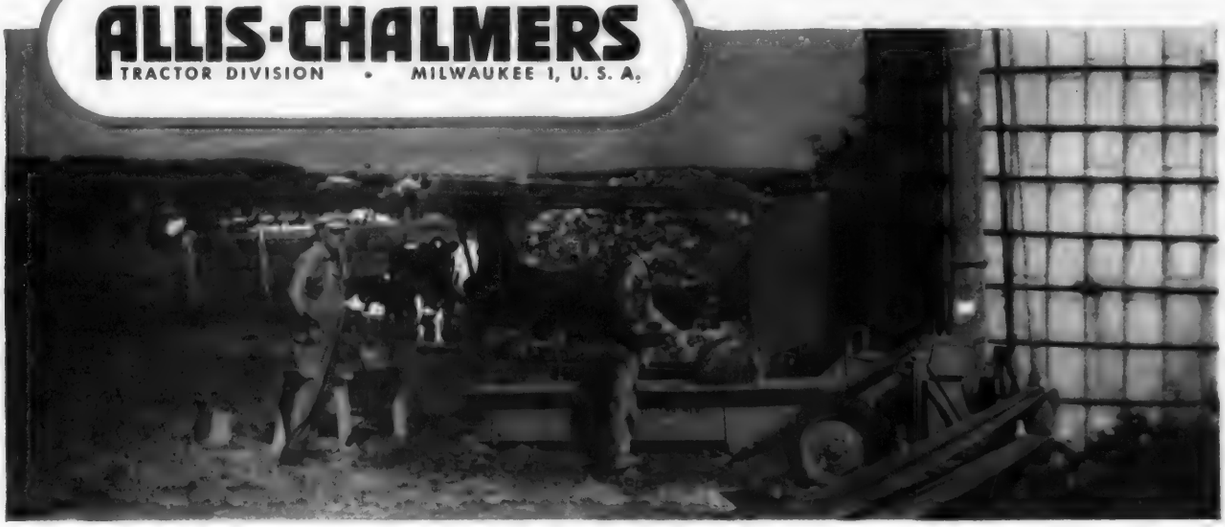
ROTO-BALER and ALL-CROP are Allis-Chalmers trade marks.

FORAGE BLOWER

Has big nine-inch pipe capacity to match the Forage Harvester's tonnage. Power-saver blower fan has special curved blades that overcome friction-drag, throw into highest silos. Long, low, 11½-ft. lift-up blower conveyor is ideal for power unloading wagons.

Properly capped, silage can also be stored in outdoor stacks or trench silos.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



HOW TO BUY A FARM

BY GRANT CANNON

PICKING a farm is like picking a wife, you start with the whole world to choose from and eliminate all others until you arrive at the one with which you are willing to spend the rest of your life. Like picking a wife it should be a pleasant task filled with excitement and adventure, for the man who is bitten by the urge to buy a farm is like a man in love; he should be willing to spend some time with his would-be farm testing himself and the farm against each other to find if they are well matched. Too often it is a case of love at first sight, and then regret down the years.

Men buy farms for many reasons: (1) As productive property with the intention of operating it themselves. (2) As a home for themselves or members of their family. (3) As an investment, a hedge against inflation, to be managed by professional managers and worked by hired labor. (4) As a hobby because they love farming and can afford to own one. (5) As a hiding place for 75 per cent tax dollars.

"Before a man buys a farm," says John E. Orebaugh, real estate dealer in Wilmington, Ohio, "he should decide what his reasons are for wanting one.

YIELD AND FERTILITY of the soil can be estimated when the crop is growing. If the farm is seen in the winter, check graneries, stubble, or records for clues.

"For instance, if a city man came to us and asked us to find a farm between here and the Ohio River as an investment in agriculture, we would certainly advise against it. Look at a soils map of this region. Here we are, almost on the dividing line between the rich soils of the north and northwest and the poor soil to the south. This land between here and the Ohio is a silt loam of low productive capacity due to a lack of humus, acid soil, and an almost impervious hardpan that makes drainage a serious problem. Most farms in this area lack that essential factor we look for in soils, a basic capacity to produce. They will require more lime and fertilizer than the land to the north of us, and the poor drainage makes it impossible to count on making more than three out of five corn crops.

"So, if the buyer is looking for an investment, the country down here would be the wrong place to hunt for it. If he is looking for a country place near town and doesn't really care too much about farming, that is a different matter. The soils in the region won't make too much difference anyway.

"In starting out to find a farm," Orebaugh continued, "a good method would be to begin with a soils map of the area in which you are interested and locate the land that has the capacity to produce."

This is the counsel of a man who has been dealing in farm real estate for over half a century.

There will be exceptions, of course, islands of good land in poorer regions or unproductive spots in the rich lands, but this difference will be found when the specific farm is being investigated. In general, a safe rule is that the more productive the general land area the better chance there is to find a productive farm, and the productivity of the soil is fundamental to the success of practically every type of farming.

The Individual Farm

The nature of the farming enterprise that is to be followed on the land will be a second guide in looking for a farm. A man interested in buying a dairy farm would do well to look for one in that part of his area where dairying has been most successful; one interested in hog raising will look for a concentration of grain and hog farms. Many of the state agriculture departments have maps showing the major crop and livestock areas within the state.

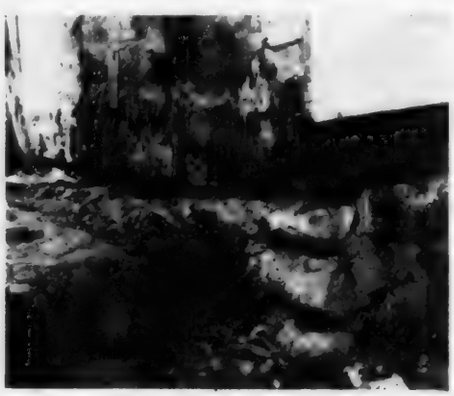
Using the crop and livestock map and the soils map as a guide, the prospective buyer can narrow down his search to a limited area in which he knows he will have the best chance of finding a productive farm adapted to his needs. The next step is simple: the farm seeker notifies the real estate agents of the kind and location of farm that he seeks. He also looks in the real estate columns of the county paper and drives through the section he is interested in.

He may not find *the* farm he is looking for immediately, but, even in these days of rising prices when farm owners are tending to hold on to farms, he will find some that are for sale. Farm prices, which had leveled off and even declined after 1948, began climbing in the spring of 1950 and have gone up over ten per cent since that time. The tendency of farm

A CAREFUL CHECK may reveal the need for costly repairs to fences, sills and roofs.

SECRET PASSAGES reveal the presence of termites. They cannot live in the open.

A DAMAGED FOUNDATION is costly to repair and is often hidden from casual check.



owners is to hold the best farms off the market when prices go up; those that are being actively pushed are often the poorer farms.

"The first thing the non-farmer buyer should look for when he has found a likely farm is advice," Orebaugh said with a slow smile. "There are usually plenty of reliable people to advise him: the county agent, the professional farm manager or appraiser, a farmer friend, or he can go to the local bank and get the name of a reliable farmer in the neighborhood. He certainly shouldn't go into a farm purchase at today's prices on the basis of the representation made by the seller."

The beginner at this game of farm judging may be able to pick up a clod of earth, crush it, and let the soil sift through his fingers with all of the earthy authenticity of Henry Hull in Tobacco Road, but he will be fooling only himself. The expert doesn't depend on a single clod to tell him the story and he won't rely on an appearance of wisdom. He will walk over every foot of the farm and he'll carry a check list to make sure that he hasn't missed anything.

The first question on his list will probably be: Is the farm large enough to be operated economically? The farm should produce a living for the operator and a fair return on the money invested and a farm that is too small or has too little tillable land won't do either. What constitutes an economically sized farm depends on the type of agriculture to be practiced; a farm that is too small for dairying may make an excellent size for vegetable growing; a large dairy farm might be too small and too hilly for grain farming. Looking at the farm size from the point of view of labor and machinery is another measuring device. Is the farm large enough to make adequate use of machinery? A 150 acre farm will probably require the same complement of machinery that could service 300 acres. There is an absolute assurance that labor will be in short supply for some time to come; a farm that only requires and can only pay for a part of man's time is not likely to attract any labor at all.

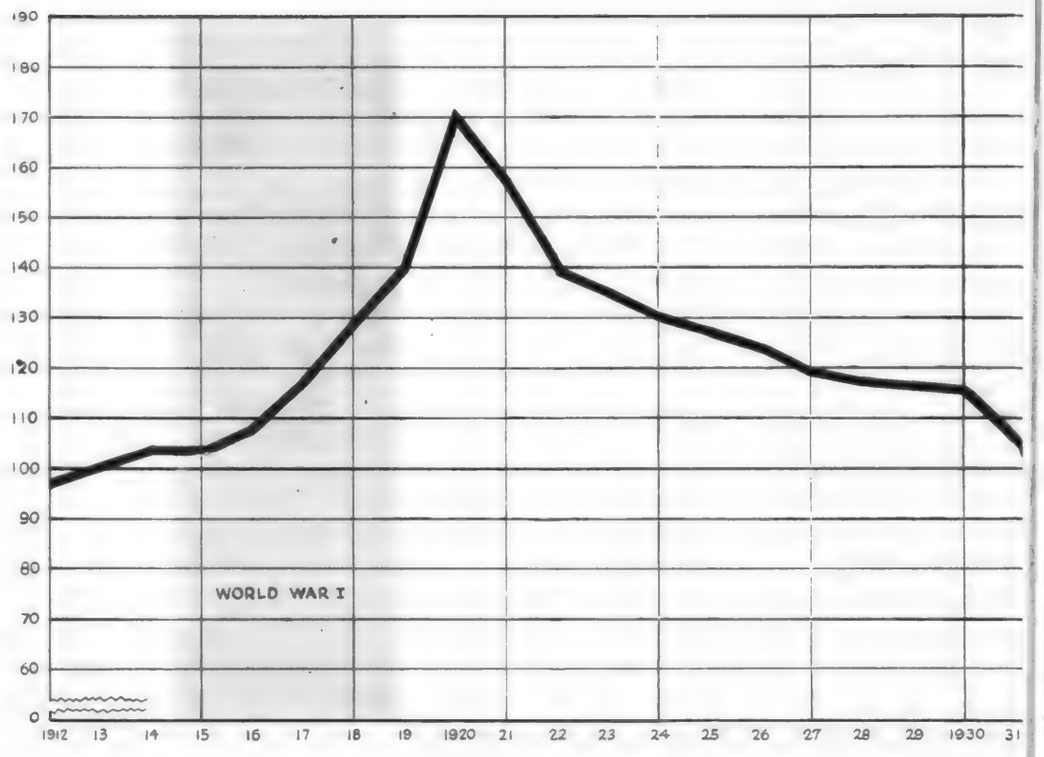
The second question to ask might be: Is the farm located on a hard-surfaced, all-year road? If impassible roads regularly isolate the farm, the buyer should think twice before he selects such a place. It would take a great reduction of the price of the farm to pay for a new road.

Assuming that there is a good road, where does it lead? How far is the farm from the market for its products, from a school for the operator's children, from a church of his faith, and from a shopping center? Good schools, churches, and shops reflect the general prosperity of the neighborhood and may mean the difference between securing labor or doing all of it yourself.

The case of Vaughn Johnson is a good illustration of this point. Johnson is a ruddy, balding man of 42 with a wife and three school-aged kids, about $9,000 tied up in machinery, and a proven ability to farm. He had almost concluded an arrangement to take over a 280 acre general farm on a 50-50 share basis; his wife, in fact, was visiting the school to make arrangements for transfering their three girls. "I'm new to this school," the principal and sole teacher told her, "but I'm whipping things into shape. I've about got the best of the lice problem and I'm installing some discipline around here with the help of a birch rod. If I could get another teacher to help me, we'd be in right good shape." The Johnsons decided to look elsewhere.

Having checked the requirements of size and location of the farm it is time to turn to the productivity of the soil. Is the soil naturally productive? Is its state of fertility at a high level? These are not the same questions stated differently. Naturally productive soils are those that can be maintained in a high state of fertility at low cost. Naturally acid soils, for example, may require four tons of limestone every decade

THE WATER SUPPLY is an important item on the check list. This pond insures adequate water for livestock. It may also supply fish for the table, water for irrigation, and an emergency pool in case of a farm fire.



HIGHER THAN EVER BEFORE, the price of farm land dismays buyers, pleases owners. The price index numbers are figured by using the 1912-1914 price as 100 and all other prices as a per cent of this figure. In some states land prices are much higher than those shown, in others prices have not reached the 1920 peak.

A WHITE ELEPHANT is costly. This one is too far gone to repair, too good to wreck.

BAD ROADS seasonally isolate a farm. The cost of repairs is part of the farm price.

A SOIL TEST shows the state of fertility and the future fertilizer requirements.

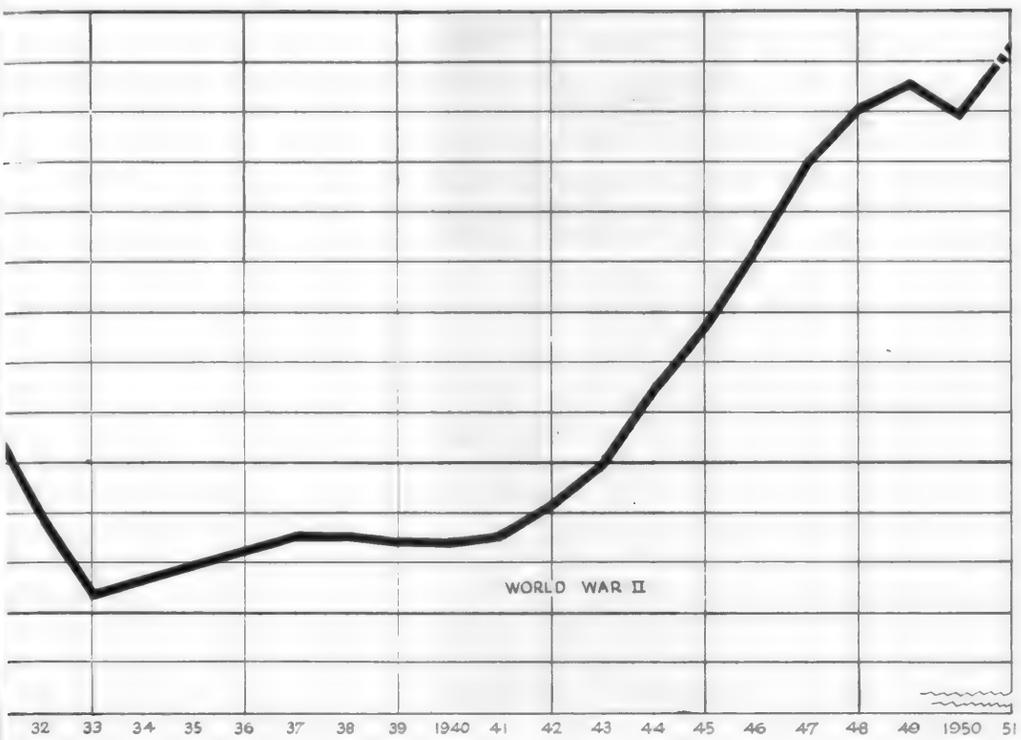
as compared to a soil with a limestone base which requires very little additional lime. This may mean a cost of as much as two dollars a year extra for each acre. Soils with a high humus content will be more productive than soils with less organic material in their make-up and will require less fertilizer to keep productive. If the farm is satisfactory in other respects it would certainly pay to have a soil test made to determine the exact fertilizer and lime requirements.

While the climate of the region is taken for granted, it is worth checking to see if the farm is in a frost pocket and to find if there is a flood hazard. The effects of the rain on the soil are also important to check. Is there adequate drainage? What is the nature of the drainage? Internal drainage through the soil to the water table? Tile drainage? Surface drainage? What will the drainage system cost to maintain or establish? Check to see if there is any gullying, if terraces are needed, if terraces have been built. If tiling or terracing should be considered a part of the purchase price.

The payoff from good productive well drained soil is, of course, a good yield. The yield can be checked in various ways. The owner should be asked, but it must be remembered that, unless you can actually see a halo over his head, he is likely to give the highest yield his best acre of land ever made and call it average. The fields themselves give an indication of the yield. The vigor of the growing plants, if the farm is seen during the growing season, the size and number of corn stalks, the thickness of the grain stubble are all good hints. Neighboring farmers often will give a frank estimate of the productivity of the farm. And the storage buildings on the farm are good evidence in themselves. If a farmer claims to raise 100 bushels of corn to the acre and his rotation calls for 70 acres in corn each year, he should have storage space for 7,000 bushels of corn.

The position on the check list of buildings and the importance attached to the appearance of the farm home will mark the difference between the city buyer and the farm appraiser. The veteran farm appraiser will consider buildings of secondary importance to the land and its productivity. The city man runs the danger of falling in love with a view or the quaint hominess of the farm house and of giving them undue weight in his appraisal of the farm. The view, the attractiveness of the farm house, the pleasantness of the surroundings *are* important and should be considered. They, after all, have a direct bearing on salability, but they should not outweigh the consideration of the farm as a producing unit. On a large, productive farm, the buildings themselves have surprising little to do with the actual price.

Barns should be of a type suited for the farm enterprise and big enough to serve their function. They should be arranged for the best use of labor; it is always well to remember that a few extra steps between the silo and the milking barn means miles of extra walking each year and that an awkward arrangement of barn and outbuildings can consume a third of a man's labor, time, and energy without any added production. Putting the hay into the mow, and feeding it, can, for example, consume more time than did the haymaking. Old hands at barn appraisal usually cast a critical eye at the roof and foundations where age and delapidation show up first and where repairs are costly. They also check the timbers for telltale sawdust particles and the dark corners for the



covered runways of the termite. Storage buildings will be checked to see if they are rat-proof (three rats eat as much as two chickens) and if they would meet government standards for storing grain under price support loan. Every rod of fence should be checked, the wire for badly rusted stretches, the posts for rotting, and an estimate made of the life expectancy of the bulk of it and the amount that needs replacing.

Checking a farm home as a piece of property is about the same as looking over any house except that many items that are taken for granted in a city house should be specifically checked on the farm. It is not a foregone conclusion, for example, that the house will have electricity or running water and it is even less probable that it will have central heating. Men can become downright sentimental over the cozy warmth of a coal stove in the kitchen and the quaintness of a hand operated sink pump, and they feel at one with the pioneers when they jest about the outside plumbing—women folk are more likely to rebel. Every light switch, every door, the rain gutter and the shingles, the windows, the floors, the walls, and even the empty air that must be heated are all sources of expense even in a well preserved house. As one owner of a beautiful old farm house said, "If a village didn't have a century-old house on the outskirts, the Chamber of Commerce ought to build one just to keep the hardware stores in business." If the house is run down or if remodeling is contemplated, the cost can be staggering. Here the advice of an expert can well be used. He can check plumbing, wiring, foundation, walls, roof and windows: he can estimate heat consumption and give an idea of cost of reconditioning the house and a guess as to future maintenance expenses.

The presence of running water in the farm house may not be of great concern to some buyers, but the availability and the location of the source of water will be of vital concern. A plentiful supply of water for home use and for livestock must be present and must be available throughout the year. The source of the water supply, wells, springs, streams, ponds, and cistern, should be checked both for purity and for the adequacy of supply. If springs or wells have been known to dry up during the summer or if cisterns are too small, water will have to be hauled. On a livestock farm this could run into great expense. Also important to the raising of livestock is the location of water in relation to the pasture land. The seller may tell you that the well on the farm has never run dry, that the grandchildren of the original settler still come back there to drink the water because it is so pure. This may be true. But perhaps the farm has supported only 30 head of livestock, and because of today's higher costs you require 100 head to justify your additional expense of fencing and buildings. You need to determine the water *potential* as well as the way the present water requirements are met. Find out who trucks water locally during dry spells, and ask how often he has taken water to the farm that interests you. In many parts of the country the farm would be worthless if, in addition to drinking water, it does not have irrigation water too.

The Rundown Farm

In the foregoing discussion the assumption has been that the buyer would be looking for a farm with land and buildings in the best possible condition. There are farm buyers, however, who are interested in buying a rundown farm and building it up. Usually the man who wishes to do this has an income from other sources and has found that with taxes being what they are, he can bring a farm back into good condition with tax money. Money spent on repairing existing structures is, as a general rule, deductable from income taxes; whereas if the building, fence, road, or other structure were newly built it would be considered a capital investment and would not be deductable. This class of investor is not looking for more income, but rather for a place to invest present income. He finds in a rundown farm with repairable

(Continued on page 134)

SCENERY IS PLEASANT to look at, but unproductive. The charm of a homey log cabin has lured many a city man into buying a farm that was run down and unprofitable.

THE BOSS HEN

Scientists find that chicken society is like a ladder. At the top is a despotic boss, and on the bottom rung a hen-pecked outcast. Their findings may help poultrymen secure more eggs.

THE boss hen is boss by virtue of her superior strength, her mastery of the intrigue of the roost and the coop, and by sheer orneryness. Her chicken-hearted sisters rarely challenge her position. Not only must she have the plumpest grains of corn, the brightest oats, and other choice morsels, but the other hens must stand aside while she eats, or get a peck for their insolence. Not only must she have the best nest when she wants to lay an egg, but she usually chooses an occupied nest and forces the resident hen, who has warmed the straw, to give it up. When she is tired she flies to the cozy center spot on the roost and pushes the other hens off the deep end. When the queen is thirsty the other hens must step back from the fountain, for she has never heard of *noblesse oblige*.

Many a farmer, watching the endless bullying of the boss hen, has been tempted to wring her neck. But he usually cools off when he observes her lusty red comb and wattles, her nest worn tail feathers, her bleached beak and legs, which show her to be his best layer—for her natural vigor and easy life make her a top producer. And anyway he knows that if he sent her to the block, Number Two hen would come up to replace her.

Scientists, of late, have been studying the tactics of the boss hen and her sisters in order to learn how the social organization of a flock might effect the laying of eggs. Dr. Alphaeus M. Guhl, of Kansas State College, has observed and recorded the actions of hundreds of hens in dozens of flocks and has written learned monographs on the subject. He has found that the same general social structure exists in all flocks. Each flock that he studied was dominated by a boss bird who got the best of everything and pecked every other bird in the flock, but was never pecked in return. Beneath this number one bird in the social structure was a number two bird who was second best in everything. She had second choice of tidbits, roosting place, was second to clean her feathers in the dust box, pecked every other bird except the boss, and was pecked only by the number one hen. Under the number two bird in this poultry hierarchy was a number three and a number four and so on down the line to the bottom bird in the society which led a completely hen-pecked life. She roosted on the floor, laid her occasional egg in the unwanted nest, and usually ate a furtive meal when all the others were through. Perhaps just to annoy the others, the boss hen would accasionally let this social pariah eat with her.

Dr. Guhl's observations have been made on flocks that have been allowed to form their society and keep it, on flocks that have been kept in a constant state of change by removing the queen bird each week or two and replacing her with a new hen, and on isolated birds that have been used as replacements and controls. In the flocks that were left unchanged he found that the social structure was quickly formed and remained rather stable without much change of social standing within the society. Once the social position of each hen was established the number of times birds pecked each other decreased. The establishment of the society involved a series of fights in which each hen discovered the birds she could whip and those that could whip her. Thereafter she lorded it over her inferiors and avoided her betters.

In the flocks that were periodically changed, the war for position began each time a new hen was added. Dr. Guhl found that the hens in these disturbed flocks lose weight, eat less, have smaller combs, and lay fewer eggs than birds in stable flocks or those that are kept in isolation. Birds that are moved from one of these changing flocks back into isolation gain weight and increase their laying.

Among the papers which Dr. Guhl has published on the subject are *Social Discrimination in Small Flocks of the Common Domestic Fowl, Social Dominance and Receptivity in the Domestic Fowl,*

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THE BOSS HEN maintains her position by trouncing a new member of the flock. Each new bird establishes her position in chicken society by fighting all other members of the flock to find which hens she can master and which are her masters. The black markings on the neck, wing, or tail are for quick identification.

RANK HAS ITS PRIVILEGES in the poultry world. The boss hen decides that the lower nest is best, even though it is occupied. The tenant leaps hurriedly out of the nest to avoid a pecking and the boss moves in.

THE CROWING HEN ON THE OPPOSITE PAGE is an example of poetic justice. Because she was the lowest bird in the pecking order the scientists selected her for a shot of male hormone which gave her the vigor to conquer all the other birds in the flock, and the inclination to show her masculinity by crowing.

CUSTOM OPERATORS in some areas apply nitrogen cheaper than what it would cost the farmer with his own machinery.

NITROGEN from TANKS

IF growing plants could talk they would likely spend most of their time yelling for nitrogen, for there is almost always a nitrogen shortage in the soil, rich as it may be and supplemented as it is by the farmer. On the other hand we are surrounded by nitrogen; it is everywhere. About 80 per cent of the air around us is pure nitrogen, a colorless gas. If all plants could pluck this element from the atmosphere and use it there would be fewer food shortages. But getting nitrogen to plants is not that simple. It is a complicated process that taxes the ingenuity of chemists and calls on the finest engineers of the machine age. Now, when the need is greatest, these chemists are coming through with a promising new method of applying nitrogen fertilizers to the land.

Farmers have long bought their nitrogen fertilizers in bags, as ammonium nitrate, ammonium sulphate or cyanamid. These solid form fertilizers are generally manufactured from anhydrous ammonia which is a dry ammonia gas. Now, instead of turning this colorless gas with its characteristic sharp odor into solid forms, we are learning how to feed it to plants in the simpler gaseous form. It is the richest source of nitrogen that we can offer plants.

Ammonia contains more than four-fifths nitrogen, all of which is available to plants. It carries at least 75 per cent more nitrogen than any other fertilizer. In the West where gaseous ammonia fertilizers have been widely used on irrigated lands it has increased yields as much as fifty per cent on farm after farm.

With such a record the gaseous fertilizer is attracting widespread attention among farmers all over the country. Numerous agricultural colleges are conducting research on its possibilities and farmers are already trying it on a wide variety of crops.

It is being used on small grains because the nitrogen can be applied before the grain is planted and still be there waiting to go to work when the crop needs a boost. It is being used in orchards. It is being tried on row crops in sections of the Midwest, and South. At the present time, one-fourth of all the anhydrous ammonia being used for fertilizer is being fed into Western irrigation waters.

This new fertilizer comes in much the same form that bottle gas comes to the farm for the kitchen stove. The tanks are similar. In both cases the material in the tanks is in liquid form only because it is subjected to pressure in the tank. Before it is put in the tank it is a gas and as it

Farmers can now buy nitrogen in tanks at less cost than bagged nitrogen. It is applied to the soil as a gas.

comes from the tank it changes once again from a liquid to a gas. The fertilizer is transported as a liquid and fed to plants as a gas.

How to Make Nitrogen

To make the abundant atmospheric nitrogen available to plants requires making some basic changes in it. Raw nitrogen is useless to plants and consequently it must first be combined with another element, hydrogen. First the important nitrogen is removed from the air by distillation. It becomes ammonia when it is combined with hydrogen, the lightest of all gases. It is ammonia that gives a manure pile its pungent odor. Ammonia, a combination of two gases, is still a gas itself under normal pressures, but under compression it changes to a clear liquid, weighing about five pounds per gallon. In its liquid form the newly manufactured ammonia is stored in large tanks, and later transferred into 100 gallon tanks for hauling to the fields.

What the scientists have done in making ammonia, nature does in the quiet dark cover of the soil. A small group of nitrogen fixing bacteria, especially those found on the root nodules of legumes, constantly draw free nitrogen from the air and combine it with other elements to turn it into forms which plants can use. If this were true of all plants, and if all plants could employ this method on a mass scale, there would be little need for manufactured nitrogen fertilizers. Such, however, is not the case and industry must apply mass production methods to the bacteria's task. On the modern farm with its line-up of hybrids and new crop varieties the growing plants draw tons of nitrogen from the soil, more nitrogen than nature can replace. So the farmer who would keep his fields fertile must replace the withdrawn elements.

Ammonia on Row Crops

On many farms gaseous ammonia is being applied to the soil with small tractor mounted equipment. A 100 gallon tank mounted on a tractor will treat six acres at the rate of about 40 pounds of nitrogen to the acre. The farmer who relies on ammonium nitrate must apply 125 pounds of fertilizer to do the same job, or 200 pounds of cyanamid, or ammonium sulphate. With the gaseous ammonia one man and his tractor can apply nitrogen to about 30 acres a day.

A larger operation might call for larger equipment and there are in use for this job a number of 1000 gallon tank wagons. Such a tank, which can be mounted on a four wheel wagon for about $500, holds enough ammonia to cover 90 acres of land with 40 pounds of nitrogen to the acre. Agricultural engineers at Purdue University, Lafayette, Indiana, have found that the tractor mounted equipment for applying gaseous ammonia to soil will cost the farmer about $300.

The contraption used for injecting ammonia gas six inches underground is a battery of perhaps half a dozen steel tubes welded to the backs of cultivator shovels. These tubes are connected by piping or hose to the ammonia tank and a meter controls the flow of fertilizer from the tank to the soil.

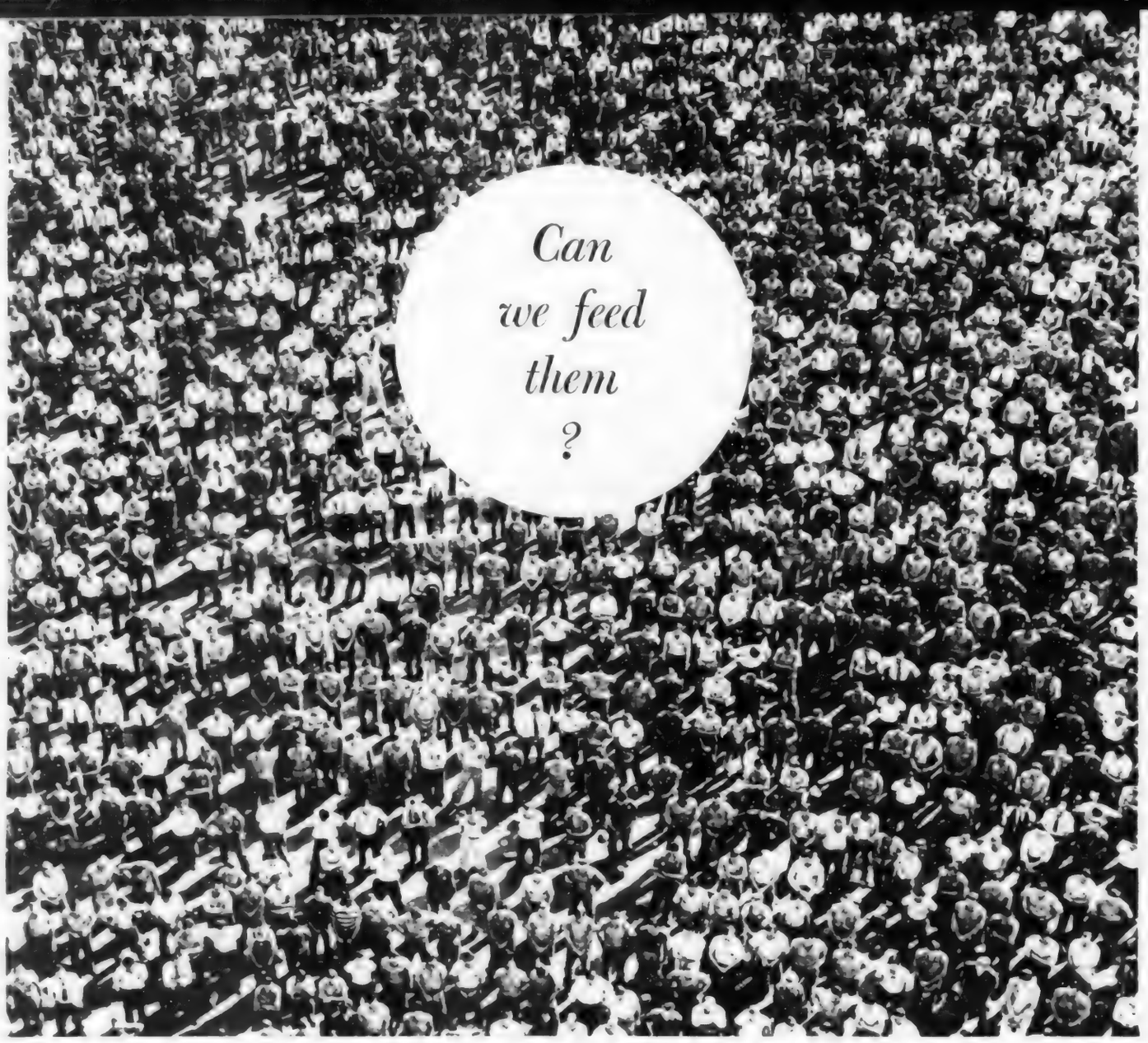
By adjusting the nozzles a farmer can apply nitrogen close to the growing row crops where it will be available as the plants need it. By placing the fertilizer six inches below the surface of the soil he prevents its escape as it changes from a liquid to a gas in the soil. The only loss is from an occasional puff of white gas that escapes as the machinery is lifted at the end of the row. It cannot be top-dressed because it changes to a gas which is lighter than air, and drifts heavenward.

The ammonia gas moves only a few inches in the ground before it is locked to the clay or organic matter by chemical changes. And there it stays until soil bacteria get to work and convert it to still other forms of nitrogen, forms which plants can assimilate and put to work.

The orchardist applies liquid nitrogen in the fall and early spring if his orchards are not irrigated. If they are irrigated he can apply it during the growing season whenever his fruit crop needs an added boost, for ammonia nitrogen is quickly and completely available. Still other farmers use it in newly prepared fields prior to planting since it will stay in the

(Continued on page 114)

THIS HOME MADE RIG for shooting nitrogen into the soil can be built for about three hundred dollars. Tubes carry the nitrogen from the 100 gallon tanks through needles behind the cultivator shovels. It is sealed in the soil six inches underground.



THE SURPLUS IS GONE

BY ROSWELL GARST

The agricultural prospect before us is one of enormous production to satisfy the insistent demands of a rapidly growing population.

THREE hundred million people are on their way to this country and they will demand food when they arrive. Not all of the shiney metal grain bins that were built to hold the surpluses of the past can accommodate the grain it will take to feed them. Fortunately they will not arrive all at once: they are arriving now and we are getting used to them. If they were foreigners we would call them a horde and build a barricade against them—but no barricade will stop these people: they are our own increasing population and they will reach the 300 million mark in fifty years.

Ours is such a lusty family, here in America, that when some 28 million more relatives pulled up their chairs to the family dinner table during the past two decades we hardly noticed it. As a matter of fact, we accommodated an increase from 122 million to 150 million people and spent a good part of the time worrying about surplus food production.

For thousands of years the population of the world stood still, just held its own. If it hadn't, all seats and standing room on this planet would have been occupied some time back. In recent years, however, the population has begun to grow again. In the United States, we gained 8 million people during the depression decade between 1930 and 1940. In the prosperous 40's we gained 20 million people for a total of 150 million in 1950. We are currently gaining population at a rate of approximately two and a half million people a year, so it is not too wild an assumption to predict a population of 175 million people by 1960. Beyond that we can foresee a possible 200 million in 1970 and the whopping 300 million mentioned above at the turn of the next century.

These population figures projected into the future serve as a reminder that it is the farmer who must feed these extra millions. The figures can also serve as a guide in his farming activities. They won't be of much help in laying the day-to-day plans, but they will be invaluable in charting the course of the next decade or two. One thing is certain, we'll not have surpluses in the future as we had in the past; we must change our economy

from fighting surpluses to concern about shortages.

The past twenty year period has been a rather worrisome time: not because of an inability to produce enough to feed our growing population, but because of our ability to over-produce and cause agricultural surpluses. With the exception of the war years when we were contributing vast quantities of food to our allies, the main problem of the Department of Agriculture has been to keep surpluses down to manageable proportions and to maintain prices at a level which were fair to agriculture. That is what you call winning a battle with one hand tied behind your back.

Now we are faced with an accelerated population increase that will add 25 million more people to the total within the next ten years, or about as many each year as now live in Iowa. Now we must ask, can we feed these added millions or are we nearing the point that Malthus predicted would come, when the ability to produce food would limit the population? We can do it. But we cannot do it as easily as we have in the past.

Three Food Boosters

The most important reason that we won't be able to do it as *easily* as we did during the past twenty years is that we have almost exhausted the three factors that contributed so much to increasing our food production during these years. These factors are: (1) the introduction of hybrid seed corn: (2) the development of the soybean into a major crop; and (3) the reduction of horses and mules on farms.

Hybrid seed corn was first sold commercially in 1924, but even as late as 1930 only about one-half of one per cent of Iowa's corn acres were planted with hybrid seed, and Iowa led the nation in its use. The real bulge in the use of hybrid seed came between 1937 and 1947 when the corn belt swung over to it. Today practically every acre of corn in the corn belt is planted to hybrid seed and eight out of ten acres outside the belt are, too.

From 1910 to 1930 we planted an average of about 100 million acres of corn that yielded an average of about 26 bushels per acre for a total crop of approximately 2,600,000,000 bushels. During the last five years we have planted an average of 85,800,000 acres and harvested around 37 bushels an acre to achieve the impressive average total of 3,180,000,000 for each of these years. In a broad way we have learned to raise 600,000,000 bushels more corn on an acreage that is smaller by 14,000,000 acres, largely through the use of hybrid seed. We cannot, however, expect any appreciable increase in yield from this method in the future because all of our corn acres are now being planted with hybrid seed.

The land that we no longer planted to corn, 14 million acres of it, we now plant to soybeans to raise 250 million bushels of beans. The total acreage of corn and the acreage of soybeans, when combined, remains practically constant during the whole period from 1930 to 1950. The acreage of soybeans grew from a million in 1930 to 14 million today and the corn acreage dwindled from 100 to 86 million.

Why are soybeans the second big item in increasing our food supply? Because we press the oil from them and feed the 50 pounds of soybean meal that comes from every bushel of beans. In doing this we have increased the efficiency of our cattle, poultry, and pig feeding phenomenally.

In 1930 the average hen layed 105 eggs a year. In 1950 she layed 165 eggs, mainly because of the better diet that came from our greatly increased supply of protein feed. And soybean oil meal is one of the most important of our protein feeds today. During this same period the average annual production of milk per cow rose from around 3500 pounds to around 5500 pounds for the same reason. The big runs of spring pigs used to hit the market in January and February. Now, because of better feeding and management, the big runs come in November and December, six weeks earlier than they came twenty years ago.

The reduction in the number of horses and mules has been more gradual, but almost equally impressive in its release of feed for the production of human food. From a high point of 26 million horses and mules, we have reduced the number to six million. When we had our peak number of horses we were working them hard over long seasons and feeding them heavily. The six million we have left practically never do hard work; they are relics, souvenirs or riding horses, and they consume mighty little grain per head. So, in addition to raising more corn on less acres, and feeding more efficiently because of the soybean, we are actually saving several hundred million bushels of grain that we once fed to horses.

These were the three most important factors in our ability to feed our growing population during the past score of years. But now that the horse and mule numbers are down to six million, and most of these on light rations, there are few further gains to be made here. With 95 per cent of the corn acreage planted to hybrid seed, there is little distance to travel in that direction. In the past we have found that our soybean acreage was hacked out of our corn land—and today we are not producing as much corn as we need—so we have about reached the end of the road here, too.

There is still some possibility of gaining more grain for feed, in exploiting these three factors, it is true. We probably don't need more than two million horses for riding purposes and as exhibits. Hybrid seed corn research men are constantly striving for higher yields and are making gradual but steady progress. Better varieties of soybeans and better cultural practices are gradually improving the yields per acre. But the big gains in human food ended rather abruptly around 1947.

The Gap

The Chart on page 35 shows the population rising at an ever-increasing rate and projecting ten years into the future. It also shows over production of meat and animal products such as eggs, milk, and butter during the past twenty years.

THE DISAPPEARING HORSE is becoming a museum piece. Replacement by machinery has released millions of bushels of grain for feeding to livestock people can eat.

This food line shows the result of our three major influences during this period. The widening gap between our increasing population and our 1950 level of production can already be seen in the high prices of meat, the increased prices for feed grains and the potential shortages of both feed grains and the meat and animal products they produce.

This gap is becoming wider in spite of the fact that the harvests of the last three years have all been well above any average of the past. As a matter of fact. 1948 brought the largest agricultural production in history, 1949 was second, and 1950 third. And yet, at the end of this phenomenal three year period, we are feeding grain faster than we can produce it. Even at this rate we are not feeding fast enough to keep our meat supply even with demand. As proof of this, cattle and sheep prices are at an all-time high, and hog prices are far above normal. A review of the corn situation during the past year or two will be worthwhile.

In the fall of 1948 the corn carryover was at its lowest point in modern times. It had almost reached an irreducible minimum. This was because of the 1947 drought which had driven the price of corn well above $2.00 a bushel during the summer of 1948. Livestock numbers had been reduced because of the shortage, a fine crop was in prospect, and farmers wisely sold everything they could spare before October 1, 1948.

We had a carryover of....	125,000,000 bushels
We produced in 1948.....	3,681,000,000 bushels
We had available in new crop and in carryover..	3,806,000,000 bushels
We had a carryover Oct. 1, 1949	814,000,000 bushels
So we consumed between Oct. 1, 1948 and Oct. 1, 1949	2,992,000,000 bushels
We had a carryover Oct. 1, 1949	814,000,000 bushels
We produced in 1949.....	3,377,000,000 bushels
We had available in new crop and in carryover	4,191,000,000 bushels
Our carryover Oct. 1, 1950	859,000,000 bushels
So we consumed between Oct. 1, 1949 and Oct. 1, 1950	3,332,000,000 bushels
The carryover in the Fall of 1950	859,000,000 bushels
We have produced in 1950	3,131,000,000 bushels
We have available in new crop and in carryover...	3,989,000,000 bushels
We will feed between Oct. 1, 1950 and Oct. 1, 1951	3,600,000,000 bushels (Est.)
We will have a carryover on October 1, 1951 of..	389,000,000 bushels (Est.)

The years 1946 to 1950 inclusive brought the highest five year average corn production, 3,165,000,000 bushels a year, in our history. Actually, four of the last five years were the four largest crops in history, 1947 being the only low year. Yet, we lack approximately 500,000,000 bushels per year in that period of producing as much corn as we will feed between October 1, 1950 and October 1, 1951. The gap is widening.

This does not mean that there can be no further surpluses. We can, and probably will at times, over-produce certain items such as potatoes or eggs. In general, however, it looks as though the lack of balance will come from our failure to produce as much as we can consume.

We are a meat eating nation, and we will pay a high price for meat in order to buy meat at the rate of about 150 pounds per person annually. That is what we are eating now and no one will seriously argue for a cutback. With full employment, it is likely that we will approach the meat consumption of the Argentinians and Australians, both of whom tuck away 100 pounds more meat per person every year than we do. But even the lower 150 pounds a year rate means that we ought to know how to produce an average of at least 3,600,000,000 bushels of corn each year to produce the meat. We fall short by 400 million bushels of doing this on a sustained basis. Any kind of bad weather which might shorten the corn crop by as much as 10 per cent below the last five year average would undoubtedly put corn prices so high that the Government would have to step in and hold them down, either by subsidizing wheat into competing with corn as a feed as was done in the early 40's, or by price ceilings on corn, or by a combination of these and other methods.

The widening gap between our production of children and our production of food will interpret itself into a continuation of high-priced meat, which, in turn, means higher priced feed grains since the demand will exceed the supply.

Parity price on corn in central Iowa is $1.55 a bushel today. The demand for feed grains will be so strong in the next ten years that they will probably average as much as 20 cents a bushel above parity. That means $1.75 a bushel for corn at Coon Rapids, Iowa.

This is a highly satisfactory and profitable price; it's a price that will give all farmers an incentive to increase production. We will simply jack up our production under the incentive of a big demand at a highly satisfactory price. Either we will jack up the line on the chart that shows food production, or we will have to drill a few holes in our belts that will permit belt tightening to a far smaller circumference than ever before.

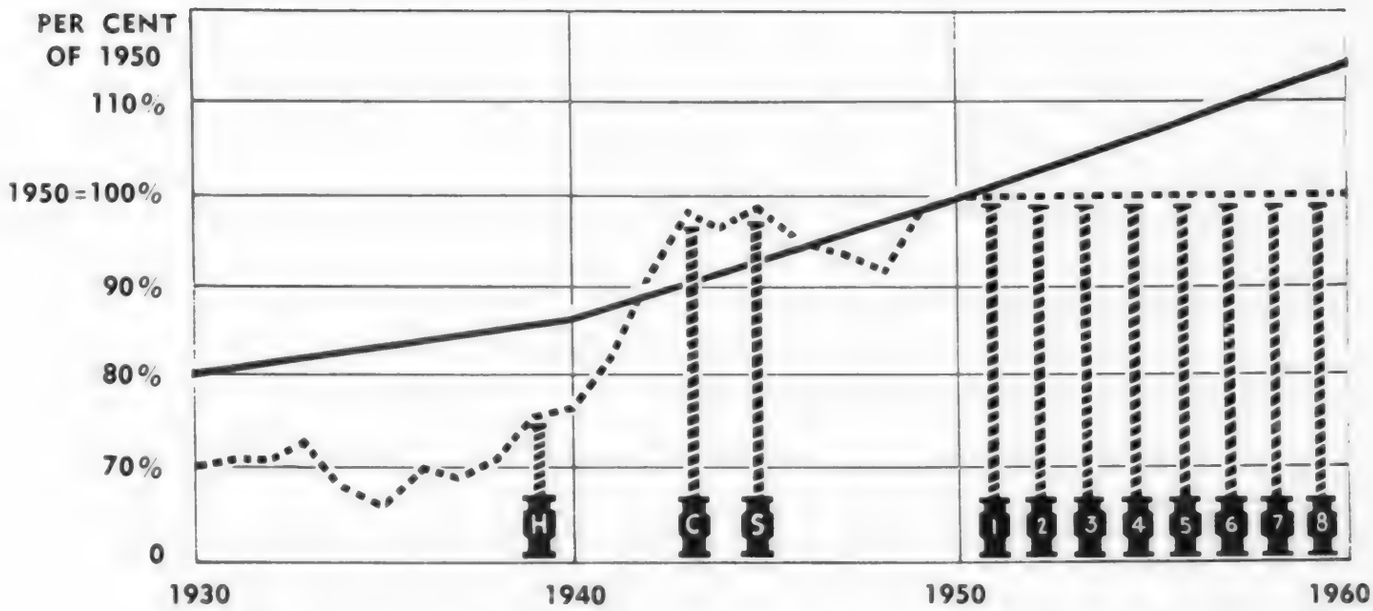
Do we have enough jacks? Fortunately we do; we have eight that are tried and proven, that will not only increase production but will also improve our farms. Farmers have always disliked intentional curtailment of production, so they will take to improved farming to meet the challenge of our increasing population. The eight most valuable jacks that we have at our disposal are discussed below in the order of their importance.

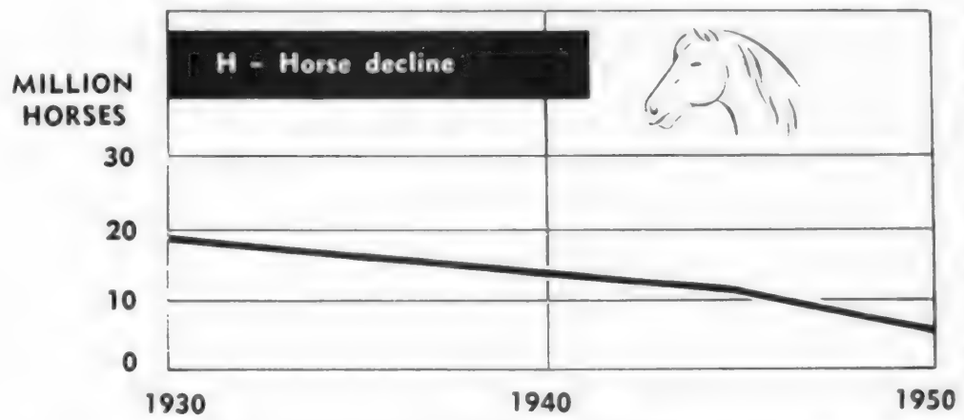
The First Jack

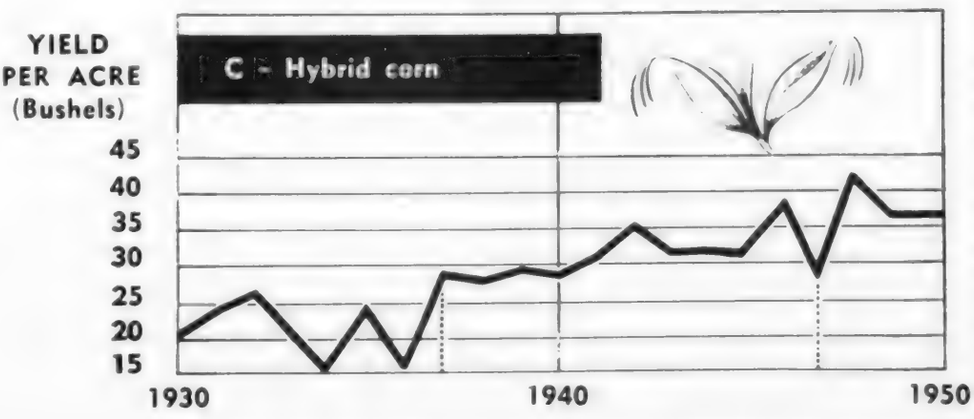
Very greatly increased use of fertilizer, especially nitrogen, is the first. The increase in the production of phosphorus and potash to meet this demand will be relatively simple; we have large supplies that simply have to be mined and pre-

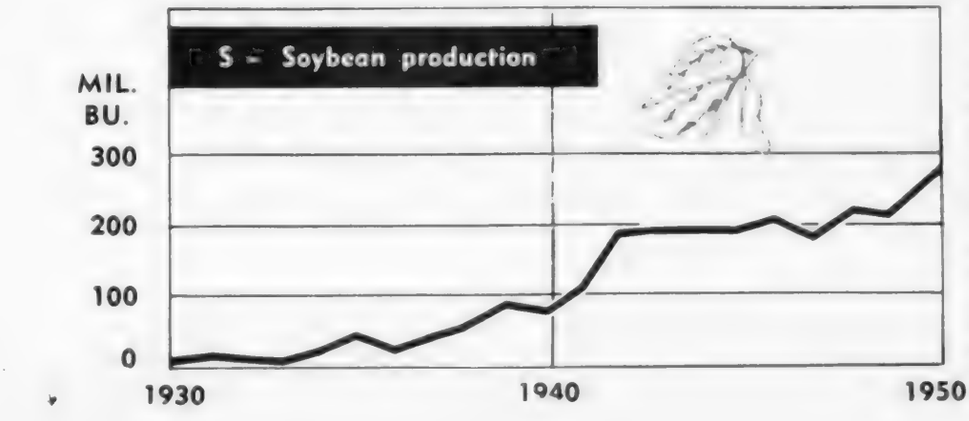
(Continued on page 129)

FEEDING CELLULOSE, CONTOUR FARMING, BETTER MACHINERY, and more fertilizer are some of the ways of jacking up production.





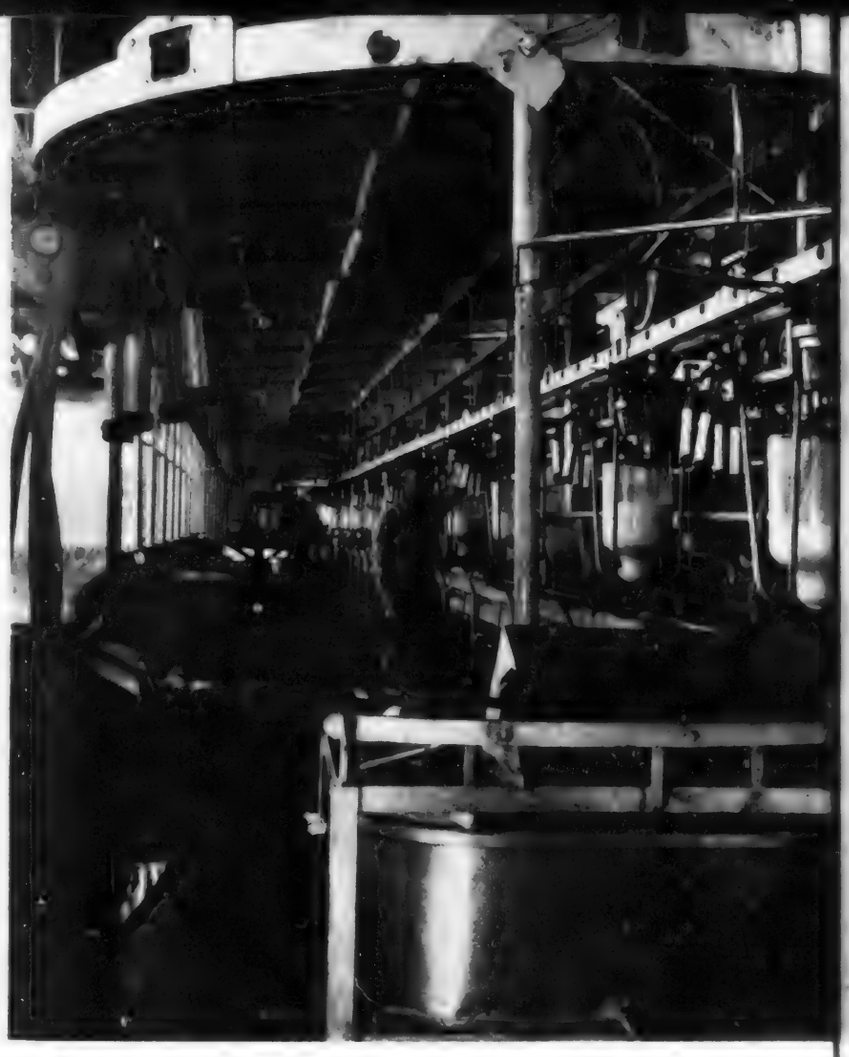




INCREASING POPULATION, shown by the red line, is pulling away from the broken line which indicates food production. The population in 1930 was 122 million, by 1940 it reached 130 million, and topped 150 million in 1950. Unless an atom bombing changes all of our calculations, it should reach 175 million by 1960. Food production, the broken line, is shown as a per cent of the 1950 rate of consumption. To meet our future demands we will have to jack up the production line with the eight tried and proven jacks we now have: (1) Increased use of fertilizer, (2) Increased use of feeding of cellulose to ruminants, (3) Improved farm machinery, (4) Hybrid breeding of livestock and poultry, (5) Increases in contour farming, (6) Better drainage and more irrigation, (7) Better rotations and improved pastures, and (8) Artificial drying of farm products.

Three factors which have jacked up available food during the past 20 years are shown in the charts at the left. Horses declined from 19 million in 1930 to around 6 million today. More important in saving feeds was the fact that before they actually disappeared the tractor had replaced them and they were off heavy grain feeding, loafing out in the pasture. Hybrid seed corn has boosted our average corn yield from around 26 bushels to 37 bushels to the acre. The dotted lines on the chart show the years during which the change-over took place. Even during 1947, a bad corn year, our yield was above previous peaks made with open pollinated seed. Through hybrid corn we have boosted our harvest from 2,600,000,000 to 3,180,000,000 bushels a year while reducing our corn acreage by 14 million. These extra acres have been used to produce the growing soybean crop in the bottom chart. A chart cannot show, however, how the soybean has increased the efficiency of our livestock feeding program.

The milking machine has had a fabulous growth since Mrs. Baldwin tried to milk her cow with the kitchen pump.



THE

THE machine age has caught up with the cow and there is not much she can do about it. Milking, once a leisurely procedure for both cow and milker, has been converted to a production line basis. The dairyman no longer chases a cow into a dark stall and sits haunched against her flank squirting milk into a galvanized bucket. Instead he arranges his cows in orderly fashion in stanchions or milking parlor, and allows them to munch grain and silage while he takes from them in three minutes what they have worked all day to produce.

The milking machine really came into power on the American dairy farm during World War II as a replacement for the hired man gone off to battle. But with the end of the war the milking machine stayed on. Every year the percentage of herds milked by machines continues to increase. In many of the large milk sheds the machine does the milking on more than 95 per cent of all herds. Ten years ago 48 per cent of all dairy herds under the Dairy Herd Improvement Association were milked with machines. But by 1950 this percentage had doubled and now 98 per cent of all DHIA herds are machine milked.

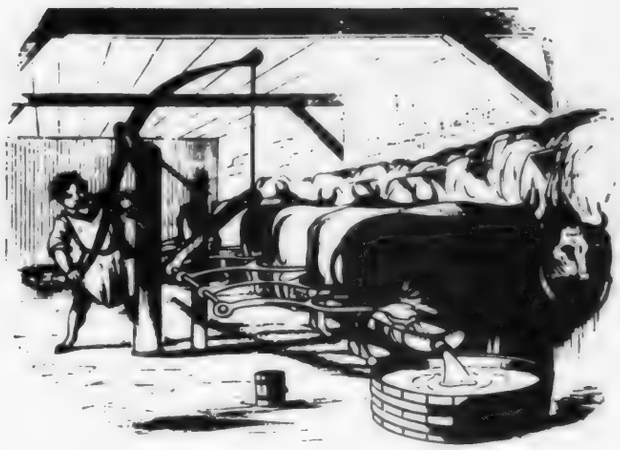
Estimates of the total number of milking machines being used today hover around a million and a half units. Each year two hundred thousand new units go from factory to farm.

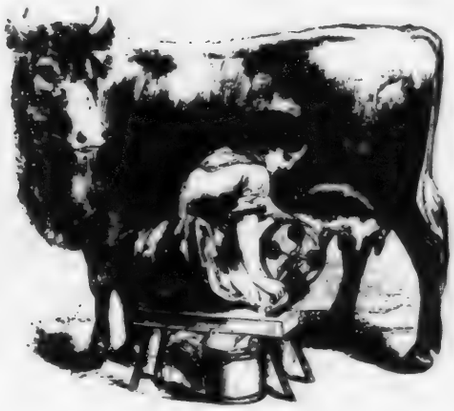
They go to dairy farms such as the one owned and operated by Cliff Davis of Willowville, Ohio. Davis, who sells milk from a herd of 18 registered Jerseys, has been milking since his father introduced him to the chore at the impressionable age of six. "At that time," Davis says, "I thought milking a cow was enough to kill me. Eventually I had my own dairy herd and I decided that I liked to milk by hand. Today I can't afford hand milking; it takes about twice as much time as machine milking the herd." When he milked by hand he had to get up at three every morning of the week. With machines he doesn't have to get out of bed until four. "A fellow can get a good night's sleep today," he says.

At least a hundred years of struggle by a long line of people who disliked hand milking led up to the modern machines, Davis and a host of other farmers now use on their milk cows. Even the ancient Egyptians were thinking of milking machines. They tried wheat straws to drain the milk, a practice which has brought many a farm lad a thrashing. A number of inventors during the last century tried to perfect the drain pipe plan, but with little success for it is neither sanitary nor efficient. In 1871 Eliza Hewitt, who milked a few cows on his little Connecticut farm, invented such a draining device which on todays market would likely sell for about a dollar and a quarter, but it would be a dollar and quarter poorly invested.

Most of the early inventors who applied their imaginations to the milking machine problem came up with a device fashioned after the human hand. They took a good look at their hands, then set about building something they hoped would work as well when wrapped around a cow's teats. W. H. Whitman built a substitute for the hand on his Pennsylvania farm in 1856. Within the contraption was a series of rollers that were expected to remove milk from a cow on the clothes wringer principle. Its failure lay in the fact that it didn't wring the cow dry enough; and the cows are probably glad that it failed.

Then the inventors took a good look around their barnyards and decided that nature made a still better milker than the human hand; why shouldn't a milking





FROM THESE primitive barnyard beginnings the milking machine gradually evolved into the production line milking plant on the left. The multi-milker above, exhibited in Paris in 1855, was ingenious but unworkable. Both of the hand cranked gadgets on the right contained rollers designed to remove milk on the cothes wringer principle. This was unproductive, and hard on both maid and beast.

MILKING MACHINE

machine be built like a calf's mouth. Here was barnyard logic which sired a series of milkers fully equipped with artificial calves tongues and palates. But the mechanical mouth never nudged the calf out of first place in the lineup of efficient milking machines. Artificial tongues refused to wrap themselves around the cow's teats the way a calf did. A blindfolded cow could have told the difference.

It remained for a farm wife. Mrs. Anna C. Baldwin of Newark, N. J., to uncover the right principle for this barnyard chore. Mrs. Baldwin disliked the twice daily milking chore. She thought there must be some easier way to get milk. She thought about the problem for several months. Then one day she was pumping water at the kitchen sink when she had a happy thought. She knew how the pump worked, it drew water from the well by suction. And if it could draw water from a well wouldn't it draw milk from a cow?

The Baldwin cow was a startled beast a few days later when Mrs. Baldwin approached her gingerly with the kitchen pump in her arms. Mrs. Baldwin had attached a refinement or two to the pump; there was a wooden bowl to fit over her cow's udder, and in the bottom of the bowl were four tubes which joined below the bowl and emptied into a pipe which in turn ran to the pump. Mrs. Baldwin placed the bowl over the cow's udder, and hung a bucket over the spout of the pump. Then she clanged the pump handle up and down. But alas, Mrs. Baldwin had mothered a failure. The milk she harvested was not proportionate to the work she did. Had her machine been a success in the cow stable she would have acquired the hatred of subsequent generations of farmers for while hand milking is hard work. pumping is still harder.

Yet had Mrs. Baldwin known it, she was on the right track. She had applied suction to the milking chore, and the same principle that is used on every mechanical milker that bridges the gap between cow and consumer.

From its primitive beginnings the modern machine milker has grown into a highly efficient farm labor saver. The modern milker, properly used, is sanitary, fast and safe for the cow. Dairymen in every state in the country have proved this and more each year are learning the fine points of fast machine milking.

On the average farm machine milking is cleaner than the average hand milking. At its best hand milking is better than machine milking, but there are few good hand milkers for hire in this age. Dairy specialists have decided that the cow herself prefers the impersonal machine to the human hand.

Today's Milker

Some two dozen milking machine companies have their products on the market. The competition is keen, and while there are minor differences between most of these makes, they all operate on the same principle.

The modern milker does a good job of imitating the calf's method. Just as the calf both squeezes and sucks, so does the milking machine. The motor driven vacuum pump supplies the suction while the pulsators provide the squeeze.

The major parts of a milking machine are the pail, pulsator, teat cups, and motor. Pails are generally made of stainless steel without dirt catching seams. They have an air tight lid and the pulsator is built onto the lid. Depending on the type milker the pail is either suspended from the cow on a sursingle or sits on the stable floor.

Who Should Have A Milker

A farmer can waste a lot of time figuring out whether or not he should install a milking machine. He wonders if he is milking enough cows to support a machine, if both his cows and he would get used to working with the machines, and what mechanical difficulties a milking machine might introduce into his daily routine.

But in the long run, it is economics that forces the dairyman's hand. If he is to stay in business he must keep enough cows to support his family, and it is a cold fact that milking by machine takes less time than milking by hand.

Few dairymen will tell you that five cows justify a milking machine from the dollars and cents point of view. On the other hand, few farmers in the major milk sheds with more than half a dozen cows would be without a milking machine. On most farms the milking machine becomes a paying device some place between five and ten cows. An older man, who figures it is time to take it easy, can usually talk himself into buying a milking machine for three or four cows.

Dairy experts at the University of Illinois decided several years ago to check up on the relationship of milking machines to money. In a study which included more than two hundred Illinois dairy farms they found that farmers were definitely saving money with milking machines. The machines were saving these farmers an average of 17 man hours of labor per cow each year. At the time the saving per cow annually was $4.70, and it is a safe guess that this figure has at least doubled since then. Other states have made corresponding studies and come up with findings that favor the machine over the human hand.

The farmer setting out to buy milking machine equipment for his dairy will probably shop around much the same as he would when buying a new car. He will consider the relative merits for his farm of both the short tube suspended milkers and the long tube milkers that rest on the floor.

After he has completed his shopping tour he will decide that prices for similar equipment don't vary widely from one make to the other. The major price differences will hinge on the number of milker units he will need to handle his cows. One unit will generally milk up to 10 cows satisfactorily, and herds with from 10 to 20 cows will need two units. An average set of milking machine equipment with one unit will cost, at current prices, from $225 to $250. This price will include the milker units, pump and motor. Corresponding equipment with two units costs from $400 to $450. In either case the farmer will spend an extra eight to ten dollars for a solution rack, as well as an installation charge of about two and a half dollars per stall. Company technicians usually install the milker.

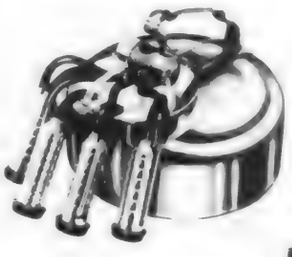
Care and Feeding of a Milking Machine

A milking machine poorly cared for is worse than no milking machine. The wise farmer knows this almost instinctively and if he doesn't, the city health department of the city where he sells milk will soon tell him so. The day is rapidly approaching when all large cities will accept only grade "A" milk. A poorly kept machine harbors bacteria and can lower the grade of milk coming from that farm. A farmer must watch his bacterial count almost as carefully as his milk checks.

Keeping milking machines clean is time consuming, but not complicated. More and more farmers are learning the fine points of the flushing method of cleaning milking machines. Followers of this plan flush all milk, milkstone, and butterfat from every part of the milker after each use, and in addition break the machine

Some of the milking machines in common use today

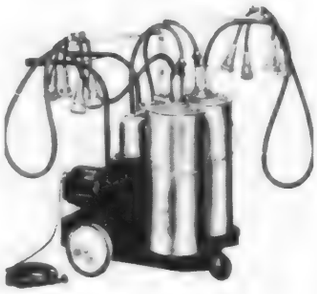
Perfection

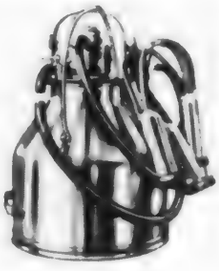


Co-op Universal

Riteway

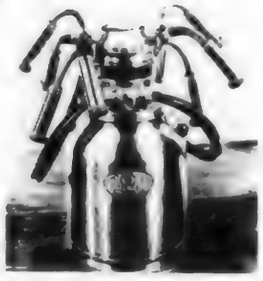
Empire





MacArtney

Marlow



Surge

Globe

down daily and brush the parts individually.

The two essentials for keeping a machine clean by flushing are to perform the chore immediately after milking the last cow, and to use wetting agents, the chemical detergents which float the milk and foreign material off the equipment. The sooner the machine is flushed the cleaner it will be kept and it should always be flushed within two or three minutes after milking is finished.

Fill a pail or the milking room sink with water that is just too hot for the hands to stand. Use enough wetting agent in this water to work up a good suds. This varies with the chemical used but is generally about a tablespoon to a pail of water. Then finish the job according to the following steps.

1. Draw the entire pailful of suds into the milking unit. Douse the teat cups in the water thoroughly and shake the pail to swish the inside clean.

2. Remove the milker head and the sealing rubber and wash these parts with a soft bottle brush. Next pour the suds back into the pail and do the same thing with the second unit.

3. Wash the outside of the milker with a soft bottle brush. If there are milk solids or dirt of any kind inside the unit it will need a complete rewash with a brush and suds. At any rate break it down for the complete job at least once a day. If the cow hasn't been properly washed before milking, or if the cup falls from the teats, the flushing method may not cleanse the machine properly.

After the daily cleansing with brushes and suds the machine should be reassembled and a pail of clean water drawn into it to thoroughly cleanse and rinse the inside surfaces. The head and the rubber seat should be scalded by dipping them into the hot water.

After rinsing, the teat cups and the milk hose should be hung in the sterilizing rack where a weak lye solution sterilizes and preserves the rubber parts. A dust proof cabinet with a small electric light bulb in it will prevent freezing and speed up drying.

When milking time rolls around again get out the pail once more and draw a pailful of sterilizing solution through the machine. This may be boiling water, or water treated with a commercial disinfectant specially prepared for milking machine use.

How to Handle Milkstone

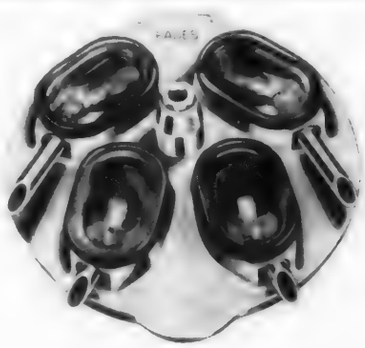
Some dairymen complain that they have trouble with milkstone forming on their milking machines. This is a dull gray film, a sediment formed by the action of chemicals with milk or water. With the proper washing compounds milkstone can usually be avoided. But if it shows up there is a way to remove it, and the milk inspector will tell you that it should be removed. Mix two tablespoons of wetting agent in a pint of ammonia and dampen the milkstoned surfaces. After a couple of minutes clean it with a wash cloth or stiff brush which has also been dipped into the solution.

Care of the Vacuum Lines

Many milking machines work poorly because their vacuum lines are clogged. Contamination comes from dust, lime, and pieces of bedding being sucked into the machine while changing from one cow to the other. Prevention is easier than correction. Contamination can be prevented in a number of ways. The barn should not be dusty during milking time. Take care to keep bedding out of the cups, clean cows properly, replace leaky inflations, and don't fill milking machine pails more than two-thirds full. Allowing the teat cups to fall to the floor, or the machine to tip over can also get foreign materials into the vacuum lines.

About every three months the lines

Hinman

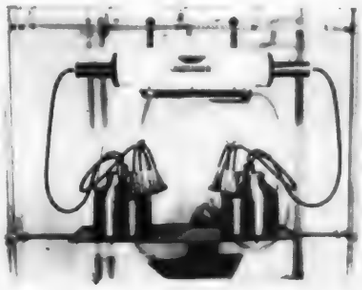


Eades *new milker head cuts off milker by quarters as milking is finished.*

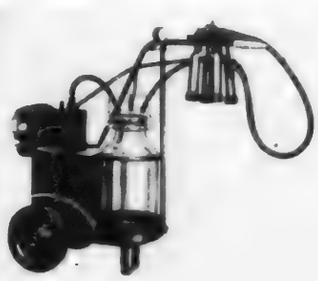
Chore-Boy

Quarter Milker

International Harvester



Ideal



DeLaval

Fords Milker

should be cleaned even if milk has not been sucked into the lines. There are two steps involved in cleaning the vacuum lines. With the end of the stanchion hose, suck about two gallons of hot water to which has been added a tablespoon or two of wetting agent or washing powder, into the lines. Draw the solution into the stall cocks at the end of the line. In this way loose materials are washed into the sanitary trap and the wetting agent penetrates and loosens the sediment inside the line.

Next mix a can of lye with two gallons of water. With the stanchion hose suck this solution into the first stall cock and collect it in the sanitary trap. Use the same liquid in each of the stall cocks. Then to remove the corrosive lye solution, which can also corrode hands, run clean hot water through all of the stall cocks, changing the water for every three or four stall cocks.

Regular inspections of the milking equipment uncovers defects in it before they become serious. As the parts of the machine are washed each day the rubber inflations should be inspected for cracks or holes. The equipment should also be checked for sediment, butterfat, and milkstone. The rubber check valves on the pail heads should be checked for swelling or excessive wear that might cause them to function improperly.

Every three months the whole system should be checked. The vacuum regulator and pipes should be cleaned and oiled where provisions are made for oiling. Oil the pump and motor and change the crankcase oil in the motor if it needs changing. Check all belts for signs of wear; it is better to replace worn belts than to be stopped by a broken one when only half of the cows are milked.

Then, about once a year many farmers like to have the fieldman for their milking machine come in and give the whole system an additional checking.

Mastitis and the Milker

There are milking machine users who would tell you two sides of the mastitis story; some will tell you the machine has meant more mastitis in their herds and others will report that they have less mastitis than when they were milking by hand. And both might be right for in either case it depends on how well the job was done. Farmers are more aware of mastitis today than they once were and consequently there is more talk about it.

Whether or not a milking machine causes an increase in mastitis depends to a large extent on the man using the milker. A machine properly used is no more likely to cause the disease than is a pair of muscular hands. The two most important points in prevention of mastitis on machine milked cows are to take the machine off the cow as soon as she is milked and to keep the vacuum from becoming too high. One New York farmer, who owns a fine Jersey herd of 160 cows had found traces of mastitis in 125 of them. He called in a service man at the suggestion of a dairy specialist who figured that the machine must be at fault. The service man soon uncovered the fact that the pressure gauge was off and the milkers were operating with a vacuum of 18 mercurial inches, about six inches too high. The pressure gauge was repaired and almost immediately his mastitis infected cows began to recuperate. The added vacuum had, in the words of the farmer, "Pulled the linings right out of their teats." He probably agrees with the Dutch farmers who say, "You should milk the cow but not pull off her udder."

A machine left on the cow after all the milk is removed will also damage the udder linings. The milk in a teat acts as a cushion to protect the linings but once the milk is in the pail the vacuum will cause inflammation in the teats. The owner may not discover the trouble until he reaps ropy milk from a mastitis infected cow. By feeling the cow's udder and learning the peculiarities of each individual in his herd the milkman can soon learn when the udder is empty. He should not wait two or three minutes to remove the machine after the cow is milked. A cow's udder may be damaged if she holds up her milk. For this reason the proper stimulation before milking becomes a weapon against mastitis.

Rubber parts on the milker teat cup should be replaced as soon as they show signs of wear. Only those designed for a particular milker should be fitted to the teat cups because poorly fitted inflations can damage the teats.

To prevent the spread of mastitis throughout the herd the dairyman should rinse the teat cups in a pail of disinfectant before moving the milker from one cow to the next.

H. G. Hodges, supervising veterinarian at the Cornell University, suggests that dairymen keep two sets of teat cup inflations on hand. Each set should be used one week, then boiled in a lye solution and given a week's vacation.

How To Use a Milker

Dairymen agree generally that cows prefer machine milking to hand milking. But there are cows that object to the noise of motors, pumps, and banging pails.

A group of three cows, in the Ohio State University herd, dried up two months after having their first calves. The dairymen explained that they had made no special effort to make these cows comfortable, that they were treated just like others in the herd. This, to be sure, is an extreme case, and a cow generally doesn't have to have a violin solo played to her before she will let her milk down. But these cases point out facts that should be observed at milking time in any dairy herd.

Cows, like humans, become accustomed to their daily routines. They know the men who work with them, and they know the machines that are used in the processes. They know the noises that they can expect to hear, and any deviation from this may cause them to hold up their milk. But assuming that the cows are not startled at milking time, there are some points which can pay off at the milk pail.

The first step in proper use of milking machines is to prepare the cow for the chore. At the Ohio Agricultural Experiment Station, C. E. Knoop and C. F. Monroe, dairy specialists, recently completed a long experiment to determine the best ways to make a cow let down her milk. Their tests proved that massaging the cow's udder for 10 or 15 seconds with a wet towel can knock a minute off the milking time for each cow.

Knoop and Monroe divided their cows into two groups, and followed a variety of plans to prepare them for milking. They outlined, on the basis of this research, four practices which helped stimulate milk letdown. Milking times and procedures should be regular. The cow should be stimulated with 10 to 15 seconds of washing with a towel dampened in warm (not hot) water. A stream or two of milk should then be removed in strip cups, and between one and two minutes (never more) should elapse between preparing the cow and attaching the milker. The

(Continued on page 127)

LARGE DAIRY HERDS like the one on the opposite page have made hand milking a lost art. The cattle in this Midwest herd are bunker fed on chopped mixed grasses and legumes. Milking, even with machines, may take a major part of the working day. The hand operated milker above is in the collection of the Smithsonian Institute. This type of milker is reported to be used today in parts of Africa not yet reached by electrification. This one has two units. The pumping is a man's job.

THE SAETERS

In Summer the Norwegian women migrate to the mountain pasture farms for the cheese and butter making.

THERE are two worlds in Norway, the lowlands with their rich farms and cities, and the highlands, with their forests and their thin mountain farms. The mountain farms, "out farms" or "saeters" as the people call them, are mostly pastures; there may be a small field level enough for a crop of hay and a log hut used as a summer home.

Most of Norway's three million-odd people live along the 12,000 miles of her tortuous coastline. From the great bulge of the inland mountains the fjords drop down to the sea. Up along the North Sea the mountains rise straight out of the sea and the great fjords of Hardanger and Songe reach a hundred narrow miles inland. Farther north, past Trondheim Fjord, the hiding place of the German cruiser Tirpitz during World War II, and along the Atlantic Ocean and the Norwegian Sea, the mountains flatten out into bleak, barren swells of stone.

Beyond the Arctic Circle, facing the desolate northern ocean, the midnight sun shines through the summer months on a cold land and a colder sea.

On the mountain-walled saeters live the highland people of Norway. Many of them own farms in the lowlands in addition to their mountain farms. In summertime the women and children go to the out farms for the few months of the short

THE CHURCH is the center of community life in the Norwegian highlands. Some are marvels of timber construction, dating back more than ten centuries. (Right) The star shows the location of Ahresaeter.

but intense growing season. A few still live on the saeters the year 'round, making a meager living from the one basic resource of the mountains, which is grass.

The true saeter dweller is almost self-sufficient, as he was in ancient days. He eats little else than the milk, cheese and bread which come from the thin acres of his farm, and the fish from the mountain streams. Life is hard; during summer, daylight lasts almost around the clock and there is a feverish haste to fill the larder for the bitter winter. And there is never very much difference between enough and not enough. Sometimes the mountain people of Norway must skimp if winter hangs on a little longer than usual.

The saeter is an Adamless Eden in summer. The men are away, either in the forests, in the fishing fleets at sea, or they work the lowland farms.

Ahresaeter

Kari Sande, a recent widow, her sisters, Anna and Astrid, her son, Eivind, and a hired man who has been with the family for 40 years, live in the Gudbransdal District. They call their out farm Ahresaeter. They have a lowland farm too, called Moen from the family name, near the village of Vinstra Station.

Kari Sande is stooped with a lifetime of hard work. Anna is the buxom one, and like Kari has the cream and roses complexion which seems to be the common inheritance of the Norwegians. Even though the family has always had little means, the table is set with good silver and the simple art objects in their homes are in exceptional taste. Norwegian women have a knack of making a home pleasant and livable. Hospitality is unbounded.

Only Kari and Anna go to the out farm and they alone milk the goats, make the cheese and butter, tend the stock and fields; Astrid is the housekeeper and cook at the valley farm; Eivind and the hired man, Petter, spend most of their time, winter and summer, on the lowland farm. They may cut the wood for the saeter, repair the sod roof of the crude timber house, and do some of the rare heavy work that the women can't do, but Ahresaeter is a woman's world.

There are eight acres of cultivated fields at Moen and 60 acres of forest. There are 12 acres in good pasture at Ahresaeter, but the goats and cattle have a much wider range over the mountain, on community pastures. All the farm stock except the animals being fattened and the horses are driven from Moen to the saeter soon after the spring thaws in late June. They are driven by the women, up the rough roads and winding paths. "The cattle need no coaxing," Kari says. "They long for the mountain pastures in the spring and the home farm in the fall."

Once the stern northern winter has unlocked his grip on the land, the long summer sun performs a miracle of growth. The mountain grasses spring up like magic, lush and nourishing. The days are warm, and there are long hours of sunlight.

The working day is not less than 14 hours, and is not measured by sunset and sunrise, for these natural time clocks would be hard taskmasters in a land where sunset and sunrise merge into one.

The work day at Ahresaeter begins at

THE SAETER HUTS are often crude, with sod roofs and mud-chinked log walls. In winter they are open as refuges for skiers and hunters. Vandalism is unknown.

six o'clock. The goats are milked and the milk separated, and Kari and Anna start the cheesemaking, which will take them until late afternoon. When the cheese is finished, Kari and Anna can think of other duties around the saeter. The whey is fed to the pigs, the stable is cleaned, and the floor of the house where the cheese was made is scrubbed. Wood is brought in and a fire kindled in the big stove and Anna starts the baking of the daily bread. Late in the evening, after the dinner, which is the biggest of the four meals of the day, the three sisters may at last sit down, but they are not idle. There will be knitting of sweaters and stockings, mending, or the weaving of a rug for the home farm.

How to Make a Cheese

The making of a cheese is a long and complicated job. After the goat milk has been separated the skim milk is poured into a large, cast iron cauldron. Ostelope, a rumen extract which assists in separating the cassein from the whey, is added and a slow fire started under the kettle. Soon the cassein separates from the whey and is scooped out and moulded. This is known as white goat cheese, and is mainly consumed at home. Then rich goat cream is added to the whey remaining in the cauldron, and the simmering continues for at least nine hours with constant stirring. By evening there is a brownish, curdish mass in the kettle, quite stiff. It is taken out of the kettle, kneaded to remove excess liquid, and placed in moulds. After setting over night it is taken out of the moulds, covered with paraffin, and is ready for the market. This cheese will keep for more than a year. Each family has its own traditional mould, hand carved and handed down.

Kari and Anna have two cauldrons and sometimes make two cheeses a day, depending on the supply of milk. Each cheese weighs 8 pounds and represesents about 5 quarts of milk per pound. This is the standard goat cheese. Norwegian Export at Oslo pays an average of $3.00 for an 8 lb. cheese, but Kari and Anna receive about twice this for some of their superior products, which they ship to tourist hotels.

Butter and goat cheese is made at Ahresaeter. At other saeters cheese is made from cow's milk, or from a mixture of cow's and goat's milk. The more goat's milk in a cheese the better the flavor. The goat cheese made at Ahresaeter has not less than 35 per cent butterfat content.

The white goat's cheese is very similar to American cottage cheese, but higher flavored, as befits a goat cheese. The traditional dish to set before a guest is a bowl of thick sour cream covered with sugar or a preserve made from tytebaer, a mountain berry with a flavor similar to the cranberry.

From the cow and goat comes the bulk of the day-by-day diet of the Norwegian mountain people. Fresh sweet butter is layered on warm bread, baked daily from rough rye and oat flour. Milk is consumed in vast quantities and cheese is eaten at every meal, and between meals.

Fresh meat is a delicacy. Only the old animals and an occasional bull calf are slaughtered for home consumption. Mostly they are sold for the cash income. Fishing is pursued not so much as a sport but as a source of food. During the summer the saeter dwellers take trout from the mountain streams in their rare spare time, and there is some ice fishing. Little fresh fish is eaten. It is smoked, salted, dried, and pickled for winter consumption. Potatoes, turnips and the hardier garden vegetables are grown on the lowland farms. There is some game.

The Full Wood Box

Wood is an ever-present problem. Many of the saeters, like Ahresaeter, are above the timber line and firewood must be brought up the mountain by sled or cart. The struggle to keep the woodbox full is quite as strenuous in the Norwegian highlands as it is to keep the larder full. Most of the forests on the lowland farms are cropped under strict government regulations. In the mountains near the timber line, where the forests are sparse and scrawny, a great deal more is graded as fuel wood. All year long the woodcutters are working in the forests, or transporting the wood upward to the saeters and down the valleys to the lowland farms. In winter, wood is the main fuel for both heat and cooking: in the summer at the saeters great quantities are required for the cheesemaking and for heat during the cool evenings.

Some of the larger mountain farms used as permanent homes may have a small field or two in cultivation—to turnips, potatoes, oats or hay, and there may be a vegetable garden. Almost all saeters have a pig or two which is fattened on the whey from the cheese making. Sometimes the men will help take off the hay from a saeter field. This will either be carried down to the lowland farm, or stocked for use when the grass is poor. Mountain pastures, except on those small fields near the houses, are thin. As much as 30 acres are required to feed one head of stock.

At Ahresaeter there are 25 Norwegian goats of all ages and sexes. There are in addition 10 cows at the valley farm. These are of a dual purpose breed and average 600 gallons of milk per year. Kari's record book shows that the Ahresaeter herd totaled 6,000 gallons last year. The goats average 300 quarts a year. During the summer all the milk goes into butter and cheese: in the winter whole milk is delivered to the cooperative dairy.

(Top down) Fire wood is placed under the stove to dry. Winter pork is fattened on whey from the cheese making. Excess whey is worked out of the cheese. The goat herd gets a treat of salt. Bread is baked daily.

The Norwegian goat is an amazing animal, easy to keep and to handle and asking little except to be treated as an equal by his masters. Goats acknowledge no social or racial distinctions; they are a part of the family whether the family likes it or not, wandering in and out of the house, perching on the roof, getting under foot. They are the most curious of animals, nosey about everything, and smart enough to outwit a man if he isn't watchful.

There is only one way to milk a cow, but the architecture of a goat permits a wide variety of stances, postures and methods of separating her from her milk. You can milk a goat on the level, from either the port or the starboard side; you can stand her on a platform and do the same. The Norwegians do neither; they straddle the animal backward, lean over, and with the nose in close proximity to the tail, milk from both sides at once.

THIS METHOD of goat milking serves two purposes—it gets the milk out of the goat and at the same time prevents her from breaking for the nearest mountainside.

The Social World

Kari and Anna and Astrid, Kari's son and Petter, go on Sunday to the church and sit among their neighbors to hear the sermon. The people of Norway belong almost solidly to the state church, Evangelical-Lutheran. Each valley has its own little church around which the life of the community centers. On foot and by wagon in summer, and by sled and ski in winter, they come from the remote corners of the valley for the only common interlude in a life of work.

Some of the little churches are marvels of timber construction. Centuries of devotion of a God fearing people have found expression in the elaborately carved altars, pews and panelled walls of Norway's rural churches. The church at Bykle was built in 1200 A.D. and except for refinement and repair, is the same as the skin-clad Norsemen, the first converts to Christianity, erected from hewn timbers 750 years ago.

During the work week all highland Norwegians wear much the same—rough wool garments, often home spun and home tailored. Except in a few isolated valleys the national costume is reserved for church, weddings, or holidays, Easter, Whitsuntide, and Christmas.

There are a few movie theatres in the highlands and most of the larger communities have youth houses where dances and parties are held. There is visiting among relatives and neighbors when the skiing is good in the winter, and when a rare slack time comes during the summer. The state provides mobile movies and libraries for the smaller communities. Many of the lowland farms now have electricity and radio, but the mountain farms are as primitive as they were in the Middle Ages. Everybody takes part in winter sports. Fishing is both a summer and winter sport and there is good hunting in season. Everybody skies, skates and sleds. In winter, the ski is the accepted mode of getting around.

The Norwegians are highly literate. Even in the isolated mountain districts children walk miles to the Norwegian prototype of the little red school house of America. Technical and handicraft schools are available to all and are carried from the elementary grades to the college level. In the off seasons, fishermen, farmers and domestic science workers may attend special schools in their crafts. In

(Continued on page 142)

GOATS demand the run of the house. Note the cream separator and the wooden bowl.

THERE IS ALWAYS the daily stint of churning. The churn is old and is home-made.

FIRST STEP in cheese making is the boiling of the milk. This takes nine to ten hours.

CATTLE RUSTLERS

WILLIAM S. MURPHY

CATTLEMEN of the Old West carried ropes on their saddle horns for two major jobs. The ropes were made to fit either the neck of an unbranded calf, or the neck of a man caught stealing one. Justice for rustlers in the early days of the West was swift and severe. Many ranchers still regard rustling only a little less serious than murder.

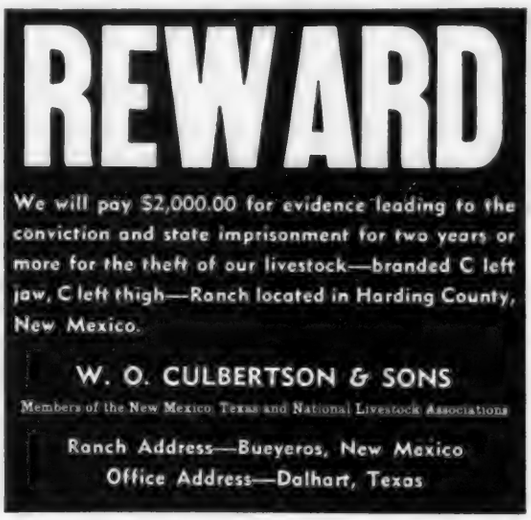
Even so, rustling was, and still is, a flourishing business. The modern rustler, a serious problem in any livestock area, has little of the glamour of his frontier predecessors. He's a small operator, taking only one or two head at a time. Instead of the huge drives which once left a trail of thievery across the western plains, the modern rustler uses a rifle and a pickup truck. He is a sneak thief, not a bandit.

It was on a June day in 1949 that five men with larceny in their hearts left Magdalena, New Mexico, in a pickup truck on the trail of a beef steak. Once out of town they turned off the road and cruised slowly over the rangelands. They were still only a mile from the highway when they spotted a fat calf. One of them unlimbered his rifle and dropped the calf. They quickly loaded it into the truck. Back in town they butchered it and divided the meat.

The rancher missed his calf the same day and called in sheriff Manuel Martinez and A. D. Reece, Inspector for the New Mexico Cattle Sanitary Board. In this case the law set a sort of record in rounding up the five men. Within two days Julian Ortega, Henry Blea, Teafelo Romero, Pedro Valenzulea, and Gregoria Garcia had pleaded guilty. Each was sentenced to not less than a year in the state penitentiary, a stiff price to pay for a fifth of a calf.

Although such small scale pilfering is typical of the modern day cattle rustler, stockmen still lose an amazing total of livestock each year to a growing army of rustlers. "There's more rustling now than at any time in the past," says Solomon Rhea, Arizona State Cattle Inspector in Tucson, and dozens of hard-pressed law

THE DAYS of the big time rustler and his overland cattle drives (left) are past. Today's rustling is less romantic, but the loss is still great.


REWARD
We will pay $2,000.00 for evidence leading to the conviction and state imprisonment for two years or more for the theft of our livestock—branded C left jaw, C left thigh—Ranch located in Harding County, New Mexico.
W. O. CULBERTSON & SONS
Members of the New Mexico, Texas and National Livestock Associations
Ranch Address—Bueyeros, New Mexico
Office Address—Dalhart, Texas

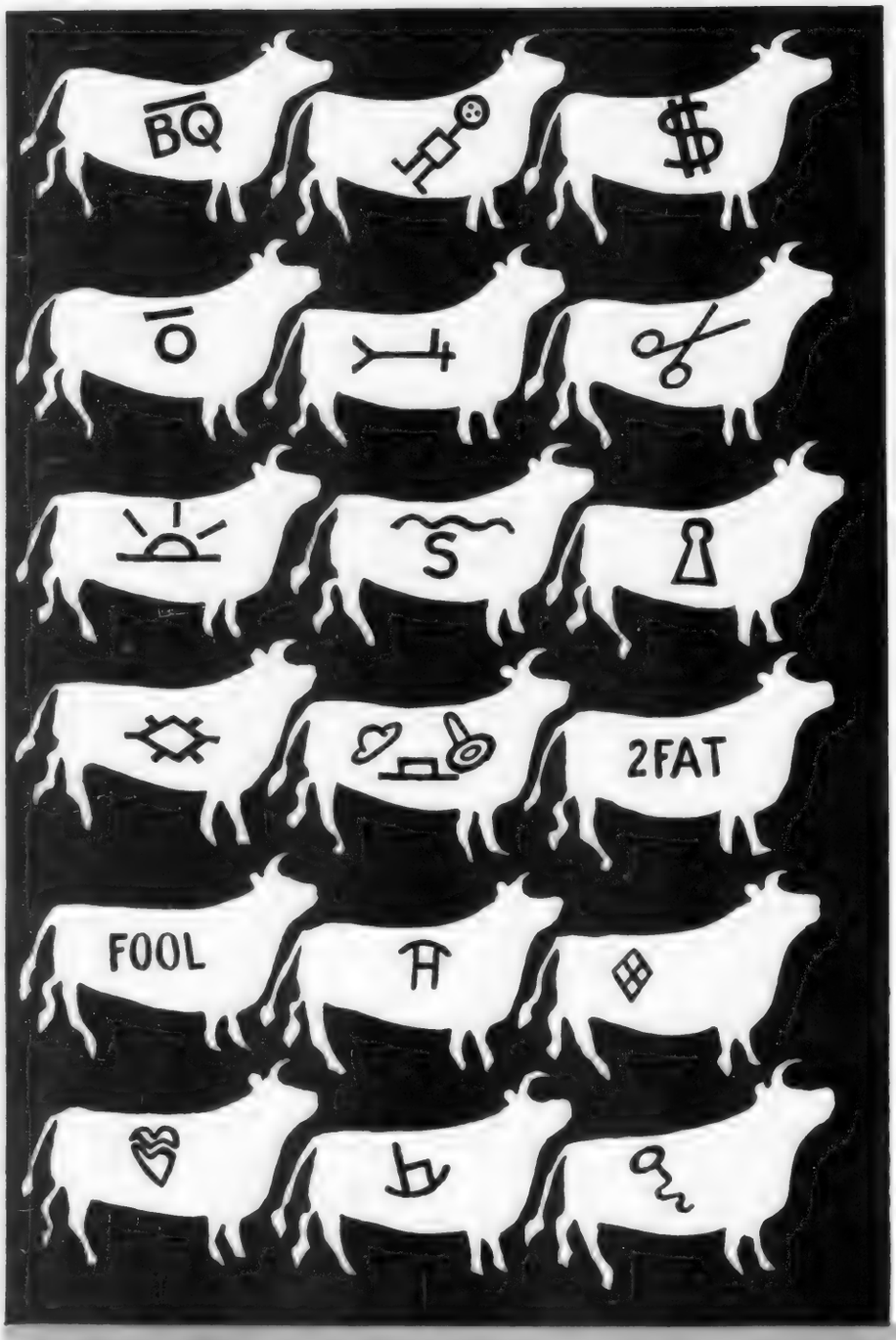
MANY RANCHERS offer standing rewards as protection against the small time rustlers (below) who make cattle stealing a million dollar a year racket.

today..

enforcement officers agree with him.

The New Mexico Cattle Growers' Association reports that approximately 400 head of cattle were stolen from ranches in that state in 1949. Maurice Williams, Chairman of the Brand and Theft Committee of the Wyoming Stock Growers' Association, estimates that stock rustled in his state each year would run considerably more than $100,000 in value. The Idaho Cattlemen's Association thinks it a good guess that annual rustling losses amount to ten per cent of the range animals in the state.

All these sources admit frankly that they don't know for sure how many cattle are stolen each year, that accurate figures



simply are not available. Hence they approach the subject with unusual caution. Based on their estimates, it is probably a safe guess that western cattle rustling is a million dollar a year racket. These losses continue despite a careful and well-administered program designed to stamp out rustling.

Always regarded as a high crime in the West, in the early days rustling was nonetheless tinged with romantic boldness. Hard-riding, fast-shooting men drove half-wild cattle, huge herds of them, for hundreds of miles. But the days of the big drives and running gun fights passed before the turn of the century.

If he is less colorful than the cattle thief of three generations ago, the modern rustler is also harder to catch. He leaves no broad trail from the thundering hooves. His methods have been altered to the times and the modern efficiency of the law. Let's take a look at those methods.

A Rustler Slips Up

It took a long time for Arizona officials to get Ray Wimberly of Tucson. He had been accused of rustling off and on for years, according to Solomon Rhea, but the officials couldn't pin anything on him until April, 1949.

About that time Wimberly and Charley Hughes drove their truck toward Marana, a small town a few miles northwest of Tucson. They pulled off the road, killed a red, bald-faced cow belonging to Perfecto Sotomeyer, loaded the carcass in the truck and took it home.

Sotomeyer filed a complaint. Rhea went to work on the case and found that Wimberly had finally made a costly slip. Rhea found a bloody canvas and pieces of hide in Wimberly's truck. Confronted with this evidence, Wimberly and Hughes pleaded guilty and were sentenced to terms of one to three years in the state prison.

"We believe Wimberly had been selling stolen meat or trading it for whiskey for 15 years before he was finally convicted," said Rhea. When Wimberly was paroled

CATTLE BRANDS . . . Cowboys would tell you that the above brands are read as follows:

BAR-B-Q	DOLL BABY	DOLLAR MARK
BAR NOTHING	LAZY Y 4	SCISSORS
SUNRISE	RUNNING S	KEYHOLE
BABY TURTLE	HAT BRANDS	TOO FAT
FOOL	SWINGING H	FIVE DIAMOND
BROKEN HEART	ROCKING CHAIR	CORK SCREW

RUSTLERS who haul off 10 steers at once are scarce today. There is room in this truck for the cattle and the two horses used to round them up. On a 50,000 acre ranch the loss may not be discovered for several days. The rustlers may still be caught when they attempt to market ungraded beef through unscrupulous grocers.

after nine months in prison, he went to Rhea's office to announce that he didn't intend to stop eating meat.

Some rustlers operate on a slightly larger scale. Back in January, 1949, J. T. DeGraftenreid stole eleven head of cattle in Catron county, New Mexico. Ten of the animals belonged to Kenneth Shellhorn, and the other one to Ted Emerson. DeGraftenreid took them from the Shellhorn and Emerson ranches north of Glenwood. He drove them into a truck and shipped them to the eastern part of the state, where they were sold on the open market near Clovis.

The ranchers pressed charges, and the finger of suspicion pointed at the sixty-year-old DeGraftenreid, who had been working in that area for some time. But the rustler had a notarized bill of sale up his sleeve. He claimed he had bought the cattle. After six months of investigation, in which the state police cooperated with

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STOCKYARD INSPECTORS may clip the hair from a steer to learn which of his many brands is the original art work.

THESE RANGELAND ETCHERS are preparing to autograph a hobbled calf. Some ranchers even sign checks with their brands.

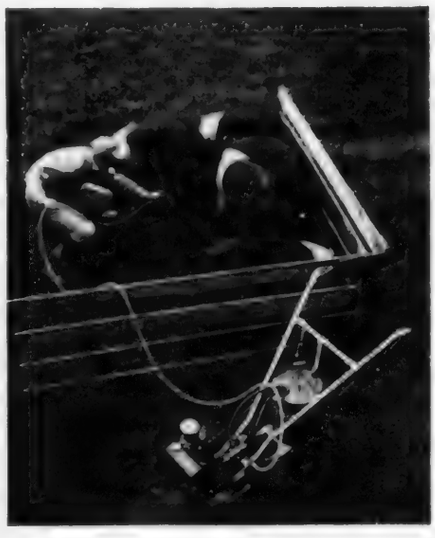
HIGH MEAT PRICES prompt much present day cattle stealing. This animal will be dressed at home, and the hide buried.

GARDEN TRACTORS

ABOUT fifty years ago a man with an aching back decided there was a better way to keep the weeds out of his garden than bearing down on the hot handle of a hoe. He bought one of the new, light gasoline engines then appearing on the market, mounted it on a one-wheel, push-type cultivator, and rigged up a belt drive to the wheel. The garden tractor was born; but it took it a long time to grow up.

For the next decade and longer other men with aching backs had the same idea, and home-made tractors sprouted up all over the country. It was not until 1915 that the first garden tractors were made to be sold at farm stores. From then until just before the second World War, the maximum sold in one year barely reached 10,000. But in the 1940's when the city man started spading up his crab grass for a victory garden, the industry spurted, and manufacturers had no trouble selling all they could make. As soon as the war was over and shortages eased up, garden tractors sprang up like hot dog stands at a county fair. Ambitious mechanics and blacksmiths started small businesses in spare rooms, and the old line fabricators increased their output. However, of the hundreds who ventured into this field right after the war, there were scarcely fifty survivors five years later. The soundly financed and promoted machines, those which were designed scientifically and were steadily improved to meet the needs of the skeptical and hard-headed dirt farmer and gardener, remain on the market.

In 1948, production reached a peak of



ATTACHMENTS for garden tractors run the gamut. In addition to the typical line shown on the opposite page, there are snow blowers, saws for felling trees, sulkys, and others. Bottom to left and around the circle: Ground traction mower, mower attachment, counter weight, disc, spray, cart, leaf sweeper, table saw, paint spray, sickle bar, power reel mower, rotary mower, cultivating and plowing attachments.

184,624. Approximately 600,000 are in use today and the 1950 production is estimated at well over 150,000 units.

Only about half of the fifty-odd manufacturers claim a national distribution. Many have local sales only, their highly specialized function limiting a wide distribution. They range from machines which can be carried in the arms like a baby, light one-wheeled jobs which do special jobs like cultivating strawberries, to heavy 5 and 6 horsepower machines which have a wide usefulness and compete with the small, four-wheel field types.

There are also the rotary tillers, of which there are at least fifteen makes, which do in a single operation the job of breaking the ground and preparing a seedbed. There are even one or two track type machines.

Some of the heavier machines are convertible to four-wheel tractors and most of the lighter machines have an attachment which permits riding. Horsepower ranges from 1 to 6 and prices from $100 to $500 without attachments.

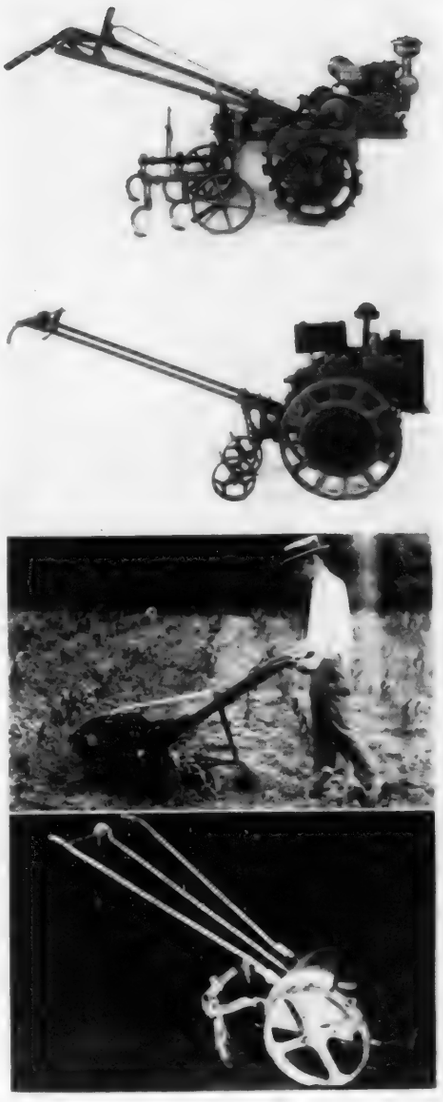
Most have gone to rubber. A few manufacturers prefer steel wheels with lugs and a few have optional rubber or steel wheels. There are one, two, three and four wheel types. The bulk are two wheel types. There is some doubt about calling a four-wheel tractor a garden tractor, but if it is purchased for a garden tractor, the buyer makes the decision about what to call it. There is a twilight area, a sort of No-Man's-Land, between the heavier garden tractors and the light four-wheeled field tractors, which is claimed by both sides. In the final analysis, the customer decides what he wants his tractor for, whether or not he wants to ride or walk. and whether or not he is willing to pay the extra cost of riding. A heavy two-wheeled garden tractor and a light, four-wheeled tractor do about the same work.

Almost without exception the modern garden tractor is an admirable machine when it is used for the purpose for which it was created, to cut down time and labor spent on chores and light farming. It does not eliminate muscle entirely and if used on a job for which it is not suited it can be a frustrating implement. The buyer should fully understand the limitations of the machine he buys. The garden tractor won't milk his cows, fill the wood box, or plow the back twenty. It is either a substitute for a larger and more powerful machine which costs more—or does a specialized job which a larger machine can not do.

The buyer should make a detailed analysis of the work he expects to do with the tractor and then buy the type which most easily can do that work. It was the farmer rather than the manufacturer who discovered that the suburbanite's evening helper could be used to do scores of farm jobs, and even now many sales managers fail to exploit the many uses of a garden tractor on the large farm. Its very name is a misnomer because its use on a farm is about 10 per cent garden work and 90 per cent farm work.

Ed Briggs, an Iowa corn and hog farmer, bought a garden tractor because he couldn't spare the time to help his wife in the kitchen garden. "I began to see its possibilities the first summer I owned it," he says. "Now I use it to finish out the corn rows which I can't get to with my big cultivator; I mow the weeds around the fence rows and in tight corners; I

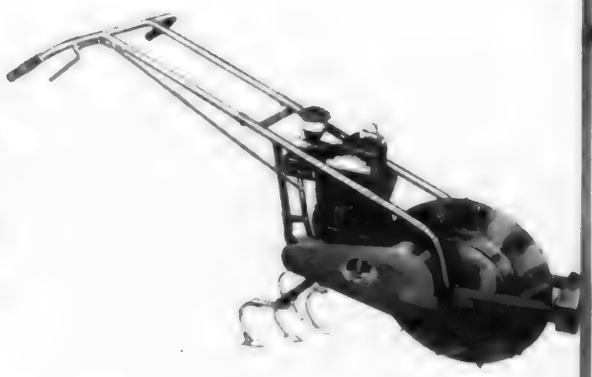
(Continued on page 91)



OLDTIMERS: Top is an early Bolens, then a Beeman, with a Bolens engine, not now made, then an early Gravely, and, bottom, one of the first Eshelmans.

WHEN THE GARDEN TRACTOR was in the diaper stage the makers gathered for a field day. All had steel wheels and many had home made engines. Gravely and Bolens are still going strong. Bottom opposite page is a garden tractor doing a big farm chore, spraying hogs.

ONE WHEEL GARDEN TRACTORS



Choremaster

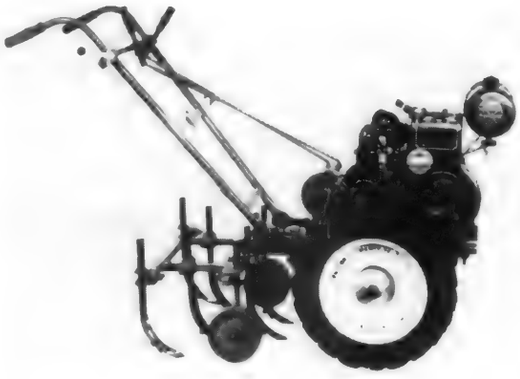
LODGE & SHIPLEY COMPANY
CINCINNATI, OHIO

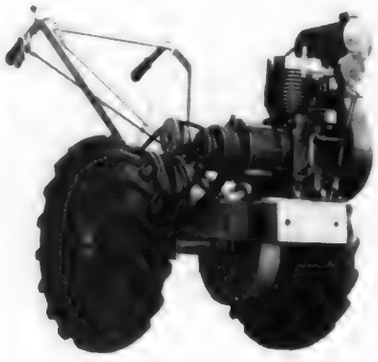
1½ to 3 hp ; attachments

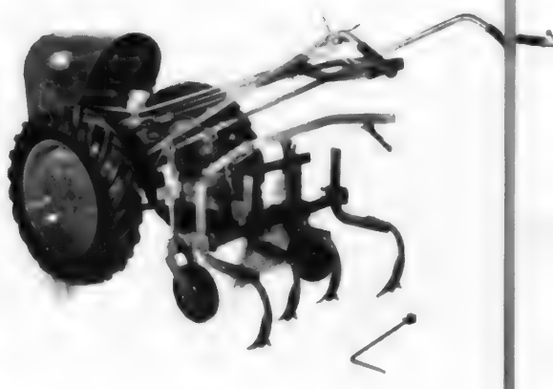
Little Farmer

WILL-BURT COMPANY
ORRVILLE, OHIO

1 1/10 hp ; attachments







Fulton

FULTON MANUFACTURING CO.
2436 NORTH GRAND BLVD.
ST. LOUIS 6, MO.

2½ to 5 hp ; attachments

Big Chief

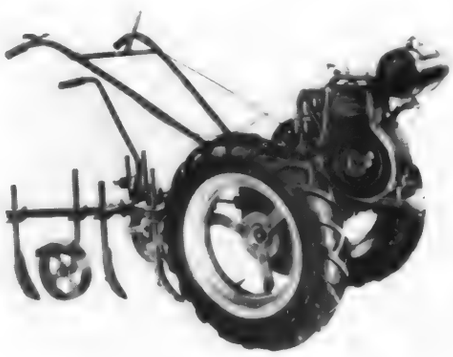
GREAT LAKES TRACTOR CO.
ROCK CREEK, OHIO

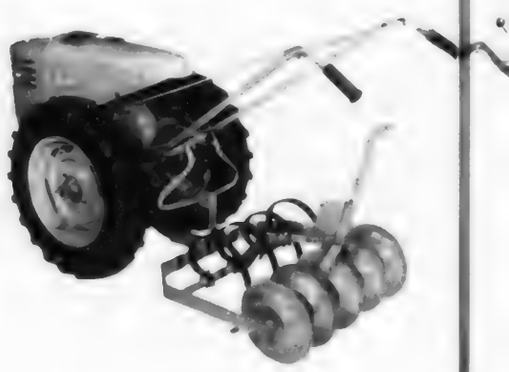
2 to 3 hp ; attachments

Page

PIONEER MANUFACTURING CO.
1910 SOUTH 81ST ST.
MILWAUKEE 14, WISC.

2 to 6 hp ; attachments





Cunningham

JAMES CUNNINGHAM, SON & CO.
12 CANAL STREET
ROCHESTER 8, NEW YORK

2 to 4½ hp ; attachments

Waterbury

WATERBURY TOOL DIVISION
VICKERS, INC.
WATERBURY 20, CONN.

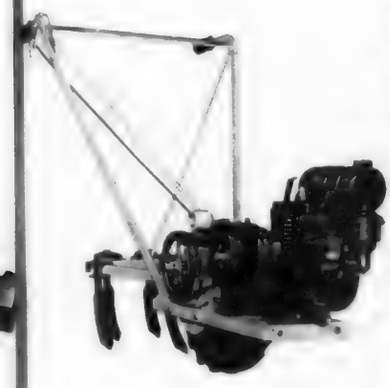
2 to 3 hp ; attachments

David Bradley

SEARS, ROEBUCK AND CO.
CHICAGO, ILL.

1¾ to 2¼ hp ; attachments

TWO WHEEL GARDEN TRACTORS



Junior Chief

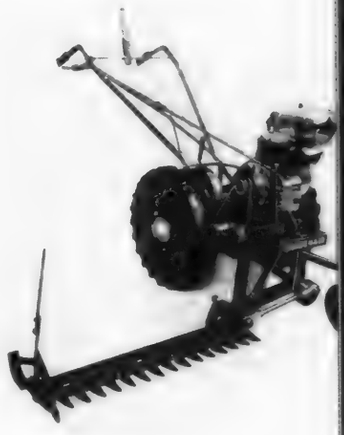
GREAT LAKES TRACTOR CO.
ROCK CREEK, OHIO

2 hp ; attachments

Kinkade

AMERICAN FARM MACHINERY CO.
1030 33RD AVE. SE
MINNEAPOLIS, MINN.

1½ to 2¾ hp ; attachments



Gardenaid

EASTERN TRACTOR
MFG. CORP.
KINGSTON, NEW YORK

1½ to 2½ hp ; attachments

Wards

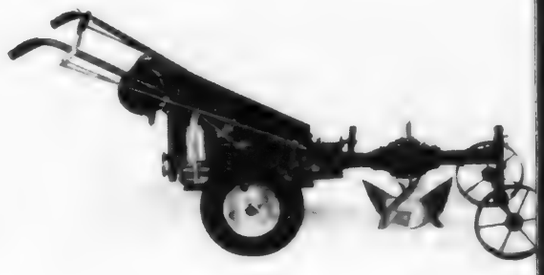
MONTGOMERY WARD
CHICAGO 7, ILLINOIS

1½ to 4 hp ; attachments

Mighty Man

MARINE IRON WORKS, INC.
1120 EAST "D" STREET
TACOMA 2, WASHINGTON

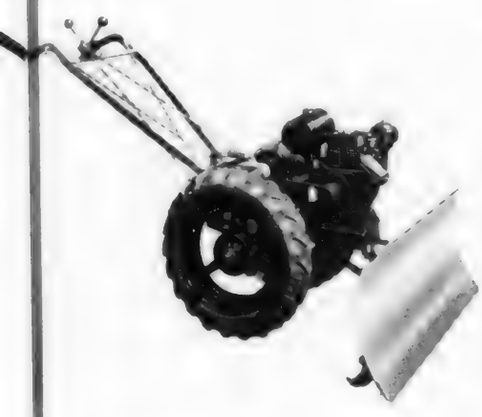
2 to 5 hp ; attachments



Gravely

GRAVELY MOTOR PLOW & CULTIVATOR CO.
DUNBAR, WEST VIRGINIA

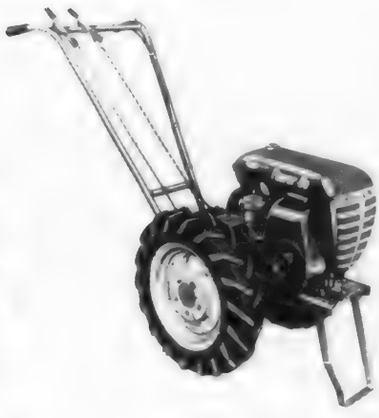
5 hp ; attachments, including rotary plow



Bready

BREADY TRACTOR & IMPLEMENT CO.
SOLON, OHIO

2 to 3 hp ; attachments



Bolens

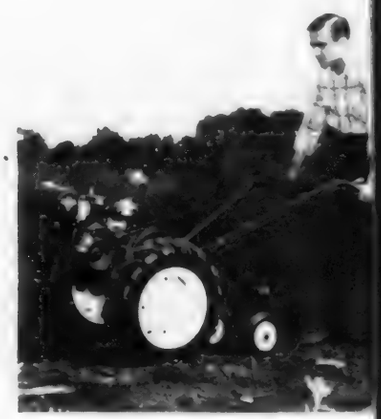
BOLENS PRODUCTS DIVISION
FOOD MACHINERY & CHEMICAL CORP.
PORT WASHINGTON, WISCONSIN

1½ to 4¼ hp ; attachments

Eshelman

CHESTON L. ESHELMAN CO.
119 LIGHT STREET
BALTIMORE 2, MARYLAND

3 hp ; attachments



Springfield

QUICK MFG., INC.
SPRINGFIELD, OHIO

2 to 3 hp ; attachments

Garden-All

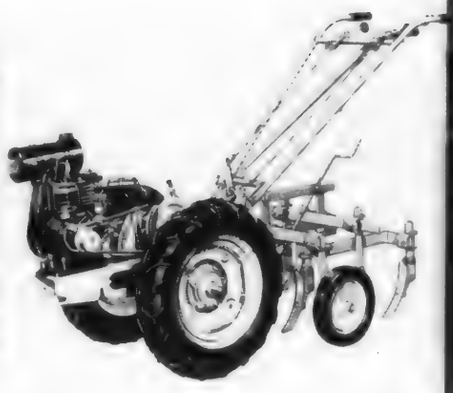
GARDEN-ALL TRACTOR, INC.
110 WEST UNION STREET
LIBERTY, INDIANA

1½ to 4½ hp : attachments

Standard

STANDARD ENGINE CO.
MINNEAPOLIS, MINN.

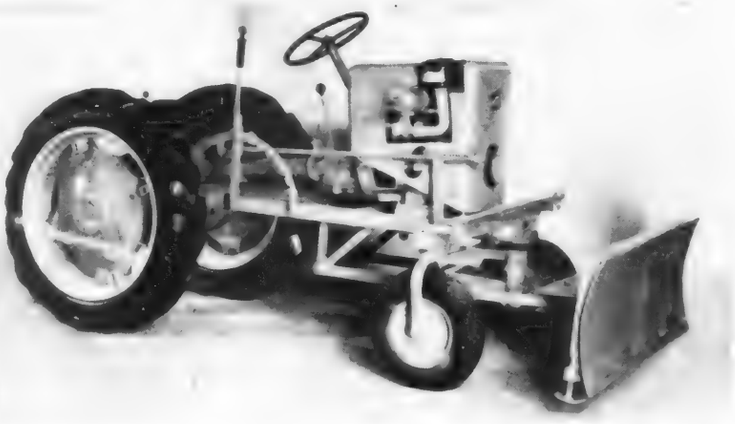
2½ to 5 hp ; attachments



Simplicity

SIMPLICITY MANUFACTURING CO.
PORT WASHINGTON, WISCONSIN

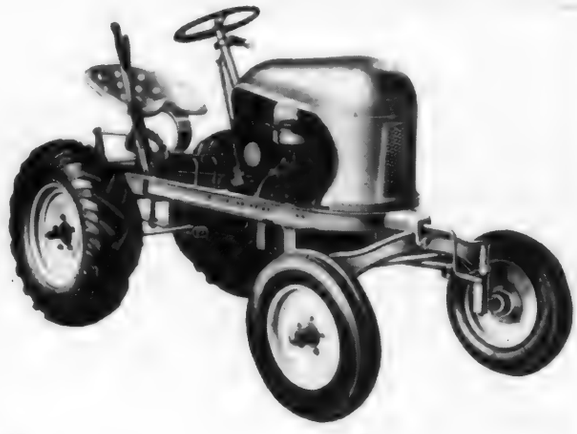
2 to 3 hp : attachments



Economy

ENGINEERING PRODUCTS CO.
915 NIAGARA COURT
WAUKESHA, WISCONSIN

7½ to 8¼ hp ; attachments



Ottawa

OTTAWA MFG. CO.
OTTAWA, KANSAS

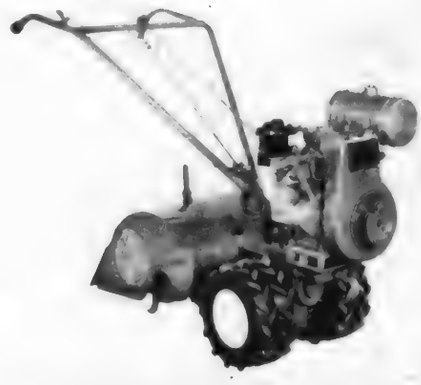
5 to 11 hp ; attachments

ROTARY TILLER GARDEN TRACTORS

Ariens

ARIENS COMPANY
BRILLION, WISCONSIN

2½ to 12½ hp ; 10 to 24-inch tiller ; attachments



M-E

MILWAUKEE EQUIPMENT MFG. CO.
SOUTH MILWAUKEE, WISC.

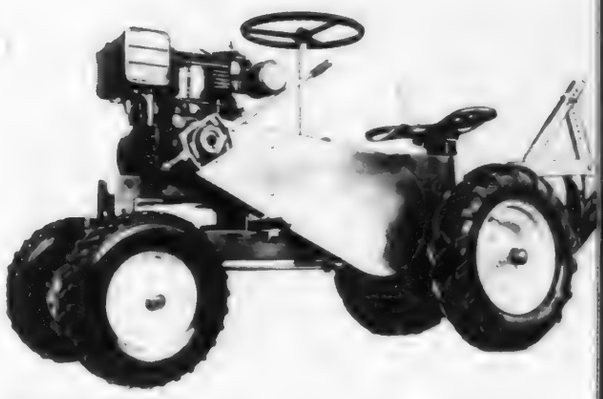
3 to 10 hp ; 12 to 26-inch tiller ; attachments

SMALL FOUR WHEEL TRACTORS

Planet Jr.

S. L. ALLEN COMPANY, INC.
FIFTH ST. AND GLENWOOD AVE.
PHILADELPHIA 40, PENN.

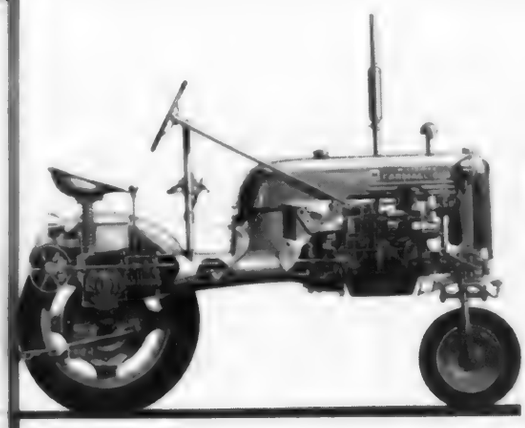
1½ to 5 hp ; attachments



Tiger

PIEDMONT TRACTOR DIVISION
INEXCO CORPORATION
EAST AND MOSELLE STREETS
KEYSER, WEST VIRGINIA

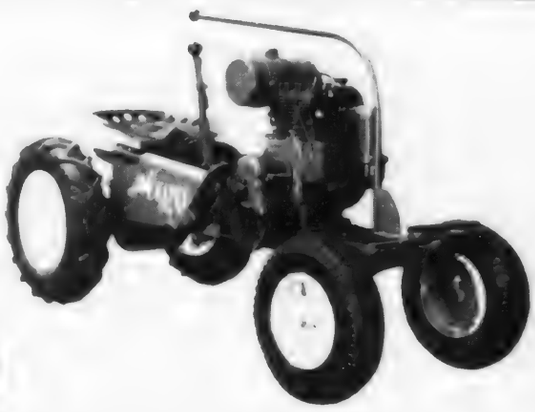
5 to 6 hp ; attachments



Farmall Cub

INTERNATIONAL HARVESTER CO.
180 NORTH MICHIGAN AVE.
CHICAGO 1, ILLINOIS

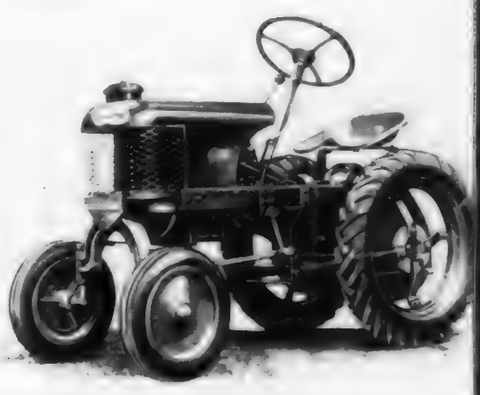
9¼ belt hp and 8⅞ drawbar hp.



Beaver

BEAVER TRACTOR CO. INC.
1495 STRATFORD AVE.
STRATFORD, CONN.

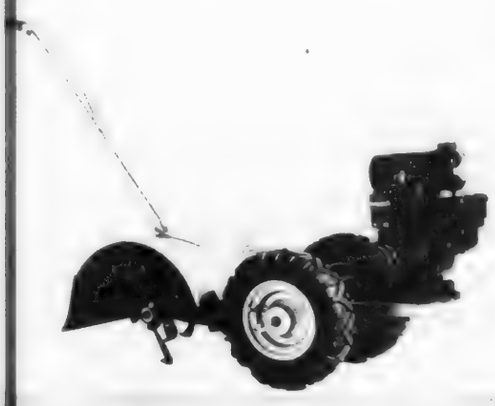
6 hp ; attachments



Gard'n Mast'r

GARDEN-ALL TRACTOR, INC.
110 WEST UNION STREET
LIBERTY, INDIANA

8 hp ; attachments



Jiffy-Till

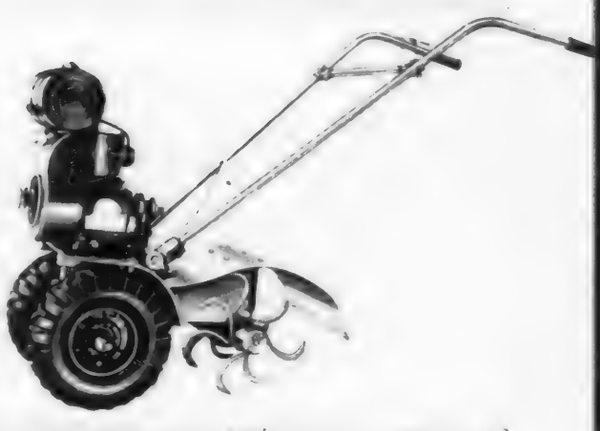
JIFFY-TILL
P. O. BOX 394
LA MESA, CALIF.

2½ to 3½ hp ; 16-inch tiller ; attachments

Rototiller

ROTOTILLER, INC.
102ND ST. AND 9TH AVE.
TROY, NEW YORK

1½ to 3 hp; 16 to 24-inch tiller; attachments



Cultiller

CULTILLER COMPANY
162 CHURCH STREET
NEW BRUNSWICK, N. J.

3 hp ; 16-inch tiller ; attachments

THE MYSTERY

What was the wild ancestor of corn, a wild grass, teosinte, or a primitive popcorn?

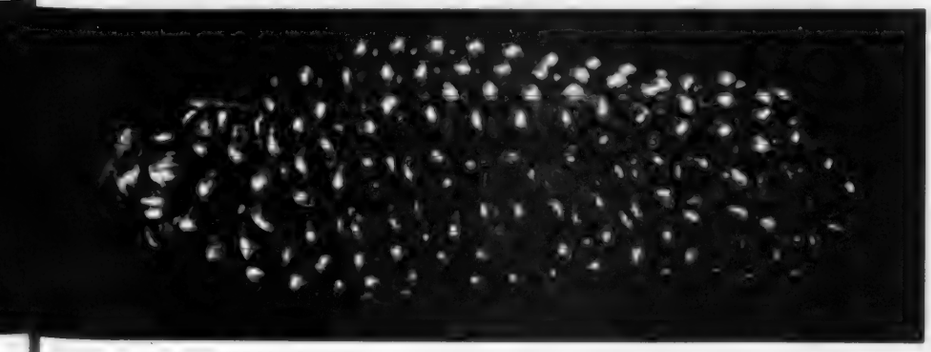
OF CORN

BY PAUL C. MANGELSDORF

The most important plant in America is corn. It is grown in every state and on three-fourths of all the farms of the United States. Corn is the most efficient plant that we Americans have for trapping the energy of the sun and converting it into food. Transformed into meat, milk, eggs and other animal products, it is the basic food plant of our civilization.

Yet corn is also a mystery—a botanical mystery as baffling and intriguing as any in the pages of fiction. The plant has become so highly domesticated that it is no longer capable of reproducing itself without man's help. A grass, it differs from all other grasses, wild or cultivated, in the nature of its seed-bearing organ, the ear. This is a highly specialized inflorescence, or flower cluster, enclosed in husks, which when mature bears several hundred or more naked seeds upon a rigid cob. The pollen-bearing inflorescence, the tassel, occurs separately on the same plant. The ear of corn has no counterpart anywhere else in the plant kingdom, either in nature or among other cultivated plants. It is superbly constructed for producing grain under man's protection, but it has a low survival value in nature, for it lacks a mechanism of seed dispersal. When an ear of corn drops to the ground, scores of seedlings emerge, creating such fierce competition among themselves for moisture and soil nutrients that usually all die and none reaches the reproductive stage.

What could have been the nature of the wild or primitive corn from which this pampered cereal has developed? Where, when and how was a species, once so hardy that it could survive in the wild, converted to a cultivated plant so specialized and so dependent upon man's ministrations that it would soon become extinct if deprived of man's help? These are questions that have puzzled botanists and anthropologists for more than a century. Now, as a result of research in botany, genetics, archaeology and history, the answers are a little nearer. The mystery has not been solved, but the web of circumstantial evidence is drawing tighter and the final solution is almost in sight.



TEOSINTE (right, below) is the closest wild relative of corn. Its tiny ear is in the sheath just below the tassel. On the opposite page is a Zapotec goddess (Mexico) clasping a small ear of corn similar to the Peruvian ear on the bottom of this page. At the top of this page is a modern ear of corn and a Bat Cave ear about 4000 years old.

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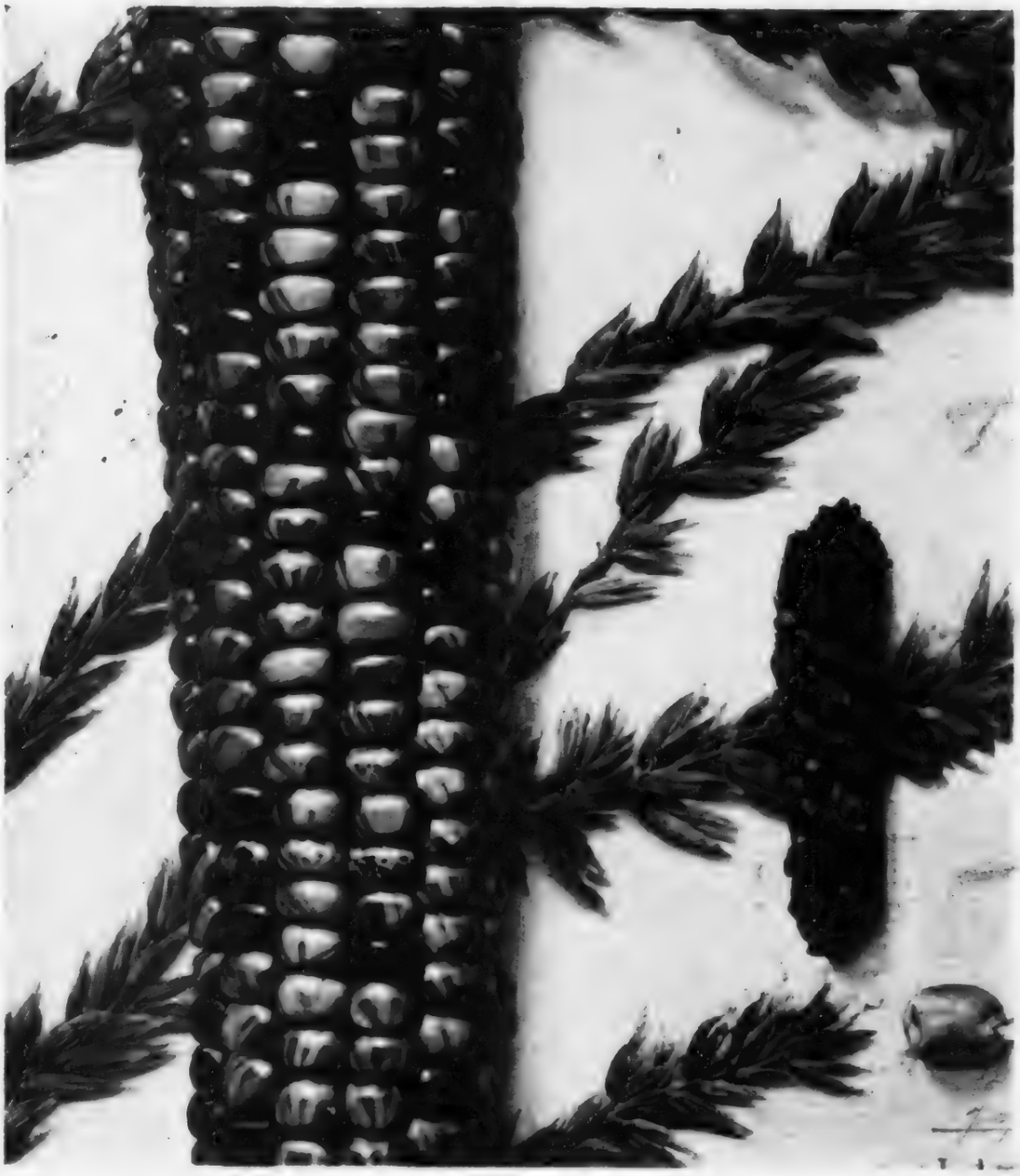
POD CORN is a primitive form of the modern variety. Each kernel on its slender cob is enclosed in a glume.

There is no evidence that corn was known in any part of the Old World in ancient times. Seeds of wheat and barley, and fabrics woven of the fibers of flax and hemp, have been found in ancient Near Eastern sites—but never grains of corn. The Babylonians and Egyptians pictured and described many plants, but nowhere in their art or literature does corn appear. Corn as a plant is not mentioned in the Bible, although some English translations do use the word as a synonym for grain. The Greeks, who had a word for almost everything, had no word for corn. The extensive ancient Chinese literature and the Vedas of India also are completely lacking in any reference to corn. There is no evidence of any kind —archaeological, linguistic, ideographic, pictorial or historical—of the existence of corn in any part of the Old World before 1492 when Columbus discovered America.

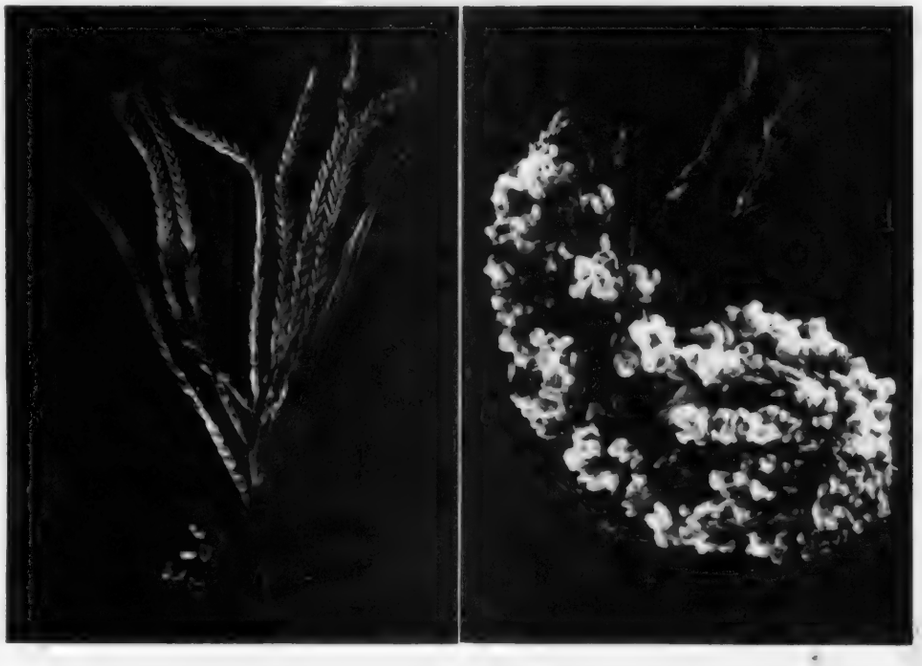
The first reference to corn in recorded history occurs on November 5, 1492, a few days after the so-called pre-Columbian period ended and modern American history began. On that day two Spaniards, whom Columbus had delegated to explore the interior of Cuba, returned with a report of "a sort of grain they call maiz which was well tasted, bak'd, dry'd and made into flour." Later explorers to the New World found corn being grown by Indians in all parts of America, from Canada to Chile, and there was a great diversity of varieties. All of the principal types we recognize today—dent corn, flint corn, flour corn, sweet corn and popcorn—were already in existence when America was discovered.

Thus the evidence that corn originated in America is so overwhelming that it seems sensible to concentrate, if not to confine, our search for its wild ancestor to the Western Hemisphere. In America corn has obviously had an ancient history. The seminomadic hunting and fishing Indians in both North and South America augmented their diet of fish and game with corn from cultivated fields. The more advanced Mound Builders of the Mississippi Valley and the Cliff Dwellers of the Southwest were corn-growing and corn-eating peoples. The highly civilized Mayas of Central America, the warlike and energetic Aztecs of Mexico and the fabulous Incas of Peru and Bolivia, all looked to corn for their daily bread. The abundant harvest that corn yielded gave these ancient peoples leisure for weaving beautiful fabrics, for molding exquisite pottery, for building magnificent highways and towering pyramids, for inventing a system of arithmetic and for perfecting a calendar more accurate than the Old World calendar of the same period. Corn was indeed "the grain that built a hemisphere."

This universal reliance of the pre-Columbian cultures on corn as the basic food plant, and its great diversity of varieties, greater than that of any other



(RIGHT) A single kernel of modern dent corn, an ear of Indian corn, a Bat Cave ear, and in the background, tassels of South American pop corn. (LEFT BELOW) Tripsacum, a wild grass that can be hybridized with corn. It is probably an ancestor of teosinte. (RIGHT BELOW) Synthetic wild corn produced by crossing pod and pop corn. The kernels have been popped by heat.



cereal, bespeak a long period of domestication. How old is corn as a cultivated plant? Fortunately this investigation is no longer wholly a matter of guesswork. Reasonably reliable estimates can be obtained by the ingenious method devised by Willard F. Libby, of the University of Chicago, for determining the age of ancient vegetal remains. The method is to measure the radioactive carbon in the remains; scientists can then determine how much of the radiocarbon originally taken by the plant from the atmosphere has disappeared, and the amount of radioactive decay is a measure of the age of the remains. Libby's determinations of radiocarbon in archaeological remains of corn tend to bear out previous estimates that the oldest corn yet found in South America goes back to about 1000 B.C., and the oldest in North America to not earlier than 2000 B.C. The oldest prehistoric ears in both North and South

(Continued on page 105)

SPRING is as good as ever. Nothing takes that away from us. We change ourselves and grow older and more weather-beaten and time rolls over us like a stream over a rock, or the wind twisting a tree: but the earth gets on getting re-born each year, and the first bright bluet of our childhood was no prettier than the bluets that star and frost the hills today. Except, perhaps, they are harder to find.

On one day in March, a day that no calendar or almanac can foretell, the barren fields seem different, the air has a warm and treacherous softness. The earth, without a single green thing growing, gives off an indefinable green fragrance. There is a smokiness on the hills that is not from brush fires, but as though the internal warmth of rising seed and moving root within the earth were giving off the faint, grey smoke of burning. Then, after this one day of warning, the soundless rush of spring begins. Earth and bark opening over night,

pushing and flowering and flowing; chrysalis, egg, and bud shattering all over the place, and the cat has her kittens in the laundry basket full of clean clothes, and straw and feathers drop out of the sparrows big oversized nest in the eaves.

All things seem possible on that first warm day of Spring. A man can win *this* year, by the grace of God, and the world is at his feet. Which is a good feeling to have for one day at least before things start getting out of hand and the world

rushes on out from under his feet. Nothing waits. And the farmer with his *diversified economy* feels as though the feverish hens, the lambing ewes, the unploughed fields, the bawling cows, the hot beds, the hungry pigs, and his wife who wants the storm windows down, were all shouting, clucking, mooing and baa-ing at him at once, in one giant and demanding chorus of the spring. In fact, the only thing about Spring that *does* delay is that small demon who waits patiently to see what plant the farmer is going to sow and where, and then with sly precision matches a weed accordingly. Were man to produce a square-leafed bean plant in the secret and sterile science of the laboratory, he had but to plant it in a garden row, and lo, between every little square leaf bean a brand new square leaf weed.

Roused out of mud by the eternal promise, the frogs begin to sing in the cold Spring nights, and as it grows warmer they lay their gelatinous plans for everlasting life as did their ancestors in the first paleozoic ooze. In April nights, if you are lucky enough to have an attic full of bats beneath the roof (moving in as the mice are moving out), the early darkness is full of silent streaking shapes of the *fliedermice,* and free of the first tender mosquito sounds.

The scents and smells of Spring are more memory evoking and returning than any diary or journal, and even in the long plod through January with a stuffed head one

can recall the sweet cold scent of wild white plum and flowering shad, and later the warm gold pollen smell of the wild grape. There is the fresh mud smell from swollen creeks, and in May the overpowering hot sweet fragrance of crab-apple blossoms in the sun. From the cultivated land the smells are more strong sometimes than sweet, the fields covered with sheep and pig manure and the orchards with the green bitter mist of spray. The paths and walks from the house to barn are a long succession of mud clumps mixed with straw and manure and little pools of rain, and mingled with the wet boot smell, the pungent scent of spoiled infertile eggs or worse, the broken fertile ones.

Around Easter when tradition demands warmth and sun and flowers, the weather turns treacherous and unpredictable; icy winds and cold rains come down over the blue hyacinths, and there have been Easters with snowstorms burying the timid lettuce, the green grass and the young red maple leaves. The mournful cooing of the doves comes muffled through the falling flakes of out-size, out-season snow.

Spring has always been a strange, bitter-sweet time of year. A mixture of fresh vigor and sudden weariness, of nasty colds and hedges of purple lilacs, of muddy cow-lots and dry green uplands, of wild unpredictable rains and the pink dependable shoots of asparagus; and one day a man thinks he can never get done of his thousand duties, and the next all things seem possible and the world is an apple in his hand.

But finally the days settle to something a person can begin to count on, the fields dry up, the white tides of apple and pear blossoms cover the orchards, the warm murmur of bees takes the place of rain, the little spotted pigs grunt through the grass, the skies are full of dry white clouds and tugging kites. The garden is put in, the children take off their shoes and wander off to the pool under the willow, and Spring is here.

JOSEPHINE W. JOHNSON

CHOLERA and the VACCINES

There is no cure for hog cholera. The making of serum and vaccine, which are preventives, is big business.

GEORGE BERGER, a veterinarian operating out of a small county seat town of southern Iowa, propped his eyes open with his thumbs and complained sadly to his wife. He was trying to keep awake long enough to eat a late, eleven o'clock supper, his first meal since an early breakfast. He had been treating hogs for cholera since before daylight, and he was not thinking kindly about the habits of farmers and the way they managed.

"I've been telling these fellows for years that they had better vaccinate their hogs, but they all said 'No, there hasn't been any cholera in these parts for ten years and we're not afraid.'"

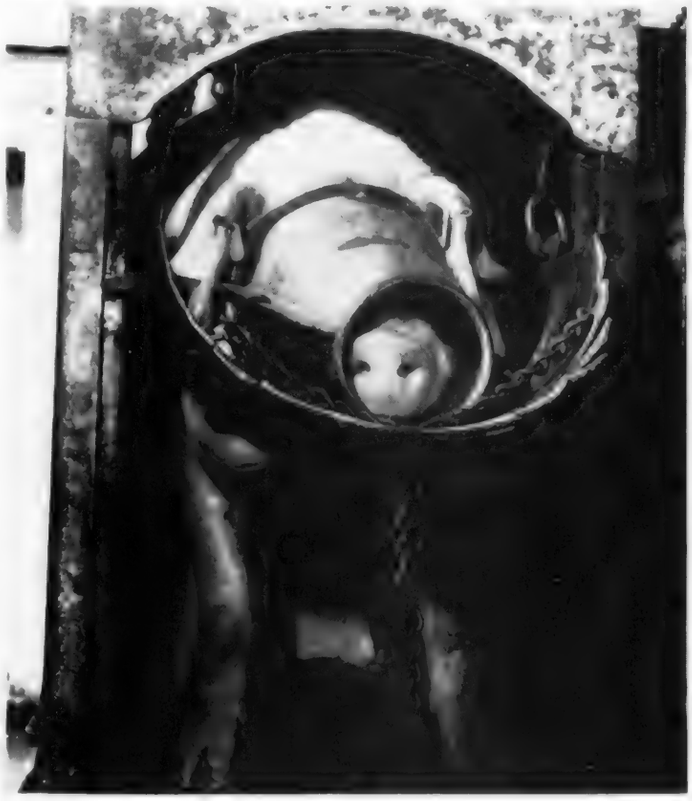
A few days before a farmer on the edge of the county had lost his entire spring crop of pigs in a sudden and devastating invasion of cholera and every man within miles had made a bee line to the telephone to ask that the vet come right out and fix up his animals.

Cholera is like that. It may go underground in a community for years; it is not dead, but waiting. Although the first anti-cholera serum was discovered back in 1907, scientists see no immediate possibility of eliminating the disease. Hog losses have been cut down by treatment and prevention, but the cholera virus is just about as wide-spread as ever. The best that can be done at present is to prevent and control. And prevention and control involve the use of virus, serum or vaccine, plus the closest attention to management. Canada has strict slaughter laws and cholera is rare in that country.

The British name for cholera is swine fever, a good name, for a high fever, 104° to 108° is one of its most prominent symptoms. The normal temperature of a hog is 101° to 103°. Fever develops within three or four days to as long as three weeks following exposure, depending on the form taken. Other noticeable symptoms are loss of appetite, weakness, constipation followed by diarrhea, and gastritis. Heavy hogs often go down in the hind quarters. In later stages the skin about the ears and on the under surfaces of the body may develop a reddish-blue color or may break out into a rash, accompanied by inflammation of the lining of the mouth and eyelids.

When a hog loses his interest in his feed there must be something dangerously

THE FORE AND AFT of an immunized hog swung up in a metal cradle for the removal of blood at a serum plant. The hog is bled three times through the tail and a fourth time when he is slaughtered. Blood taken in this manner is used only for serum.



wrong with him. A farmer is always alerted when one of his herd hangs back and doesn't come to table. Loss of appetite is one of the first symptoms of cholera. As the disease progresses the head and tail droop and the pig stands as though lost in thought. The high fever induces an unquenchable thirst; the eyes may be pasted shut.

The disease wrecks the internal organs, but shows up first in the circulatory system. Later the lungs, kidneys, spleen, and lymph glands show what the veterinarians call hemorrhagic lesions, small red spots where the blood vessels have ruptured when the tissues were damaged.

If the cholera attacks the breathing apparatus of the hog a dry cough may develop, accompanied by a nasal discharge and difficult respiration. Often hog cholera will so weaken the animal that it falls an easy victim to secondary infections which would not normally affect it. If the disease is in a hyperacute form it makes rapid progress, and the animal sickens and dies within a few days. If it is in a chronic form, the animal may linger for several weeks; during this time the hog is an active carrier of the virus and can infect others in the herd. Occasionally a recovery will occur, and this animal is immune to further cholera infection, but it too may be an active carrier.

Many of the symptoms of cholera are similar to those found in other swine diseases such as hog flu, anthrax, necrotic enteritis, pneumonia, pleurisy, and swine erysipelas: and some are not cholera symptoms at all, but secondary infections set up by cholera. A veterinarian should be called in at the first sign of sickness in any member of the herd where cholera might be a possibility.

Cholera is caused by a filterable virus, that is, a virus which will pass through the finest filter. This complicates research, since the virus cannot be isolated. Diseases caused by bacteria. which can be filtered out and viewed with a microscope, are much easier to work against. The virus is found in the blood and all excretions and secretions of the animal's body—in the urine, feces, discharges from the nose, mouth and eyes, and in the blood coming from a scratch or wound.

The virus degenerates rapidly in sunlight or in the open air, but may stay alive for as long as several months in winter in a wallow or in the body of an unburied hog. It may live in a cured ham and up to eighty days in raw pork garbage. Garbage-fed hogs have been infected in this way.

How does cholera get on a farm? For this the farmer or his neighbors must shoulder most of the blame. Some researchers say fully a third of the outbreaks is caused by transportation of the virus on the shoes of visiting neighbors from infected farms. New stock from infected areas account for 10 per cent of the outbreaks; birds, flies, dogs, escaped hogs, poor sanitary conditions, account for the remainder. It was formerly thought that pigeons were a prime cause of the spread of the virus. Many a pigeon hit the barnyard dust, but it is now known that as carriers they are negative. Buzzards and crows, which may have fed on infected carcasses, are responsible for some outbreaks. Flies are more dangerous. A housefly can travel 12 miles in 48 hours. A stable fly, gorged with the blood of infected hogs, can follow a team of horses along the highway for miles, stopping to rest and bite in pig pens along the way. Severe outbreaks have been caused by shipping infected hogs to market. This reprehensible practice of rushing suspected hogs to market may leave a trail of infection. from the farm to the stockyards and beyond to the packing plant and the garbage pail. Many serious outbreaks have been blamed on "serum breaks." There is probably ample cause for such blame. The fault is with the careless veterinarian or farmer who gives the serum. rather than with the serum itself. It will bear repeating that pigs should be in tip-top condition for treatment. Humans who eat pork from infected hogs will not get cholera, but they

may be poisoned from eating infected tissue.

Clean up the hog lot, quarantine new arrivals, don't invite the neighbors to your pig pen, and keep tramp hogs and dogs away—these are good preventive measures, but the best of all is vaccination.

Vaccination

Since scientists see no immediate prospect of destroying cholera, the next best thing is to prevent it. By far the best method is by vaccination, a term which loosely covers three methods or combination of methods of immunizing hogs against the disease.

Following are the methods:

Method No. 1. Serum from a hyper-immune hog is injected into a healthy hog. This serum contains antibodies, produced by the host hog, which battle the cholera virus. The injection of serum creates a temporary immunity of a few weeks only. It is not a cure, although large doses, injected in the first stages of the disease, seem to have some curative effect. It is useful when a short time immunity is desired—when shipping hogs, or when they are about ready to be sent to market.

Method No. 2. An injection of serum plus virus creates a lasting immunity. The cholera virus is injected into the hog. This gives him a mild case of the disease. The serum provides the antibodies to fight the disease until the hog can himself produce enough to successfully combat the virus.

This method, known as the serum-virus treatment, or the simultaneous treatment, has its drawbacks. First, the hog actually gets a mild case of the disease; his feed must be reduced, his appetite falls off, and he may be set back a few days. The younger he is the less this matters, so the simultaneous treatment is recommended shortly before or after weaning time. At this time treatment has the added advantage of requiring less serum, a matter of saving money. If cholera has already appeared in the herd, the dose of serum should be increased.

A second drawback is that if the animal is not in tip-top condition, the treatment may so weaken him that he falls a prey, either to cholera or something else that may happen along. Only healthy pigs should be treated and no one except a veterinarian or an experienced farmer can pass on this matter. Farmers are learning to do their own vaccinating. This is a routine skill not difficult to acquire.

Still another drawback is that the live virus of cholera is brought on the farm. Slipups may occur. If all the hogs on the place are not treated, the untreated ones may pick up stray virus. Slipups are usually called "breaks." A break may be as bad as an attack of the disease. It may be caused by some other disease which has weakened the animals, or by giving improper doses of the serum-virus. Too little serum will permit the virus to operate unchecked and the hog, to all intents and purposes, gets a good rousing case of cholera at the hands of his friends. Out of date serum, or its misuse, or any number of mistakes may cause a break. If the animal harbors a masked or unsuspected infection of any kind or is exposed too soon after treatment to an infection, a break may be the result.

These faults of the serum-virus treatment are sometimes too strong for the farmer; he doesn't want to bring cholera on this farm, and he frowns at the expense of treating all his hogs. Obviously the serum-virus treatment, as effective as it is when properly administered, was not yet the answer to the cholera control. That answer is some form of a vaccine which would be harmless in itself. This is the third method of treatment now being widely used.

Method No. 3. By a discovery somewhat in the nature of a fortuitous accident, it was found that if the virus were treated with a crystal violet dye it lost its disease producing properties but retained its immunizing property. This was an improvement but not the ultimate answer to the hog raisers' prayer, because the vaccine has two faults—first, it doesn't create immediate immunization. Two or three weeks must elapse during which time, if cholera is already on the premises, the herd may come down with the disease. Second, 16 per cent of pigs vaccinated with this product are not satisfactorily immunized, and the vaccine can not be used on exposed herds.

A similar vaccine developed by the same company, Cutter Laboratories, and brought out in the same year, 1933, and known as B.T.V. (Boynton's Tissue Vaccine) is made by treating the finely ground, infected tissues from cholera hogs with oil of eucalyptus. This renders the virus impotent much in the same way crystal violet does. Like crystal violet vaccine, B.T.V. has a delayed action, and does not immunize for life.

Vaccination with B.T.V. or other attenuated products does not create lasting immunity; it immunizes for 8 to 12 months, which farmers find is sufficient time to carry a pig from farrowing to market. Hold-over sows and boars have to have another treatment every 8 to 12 months. This method is popular in Europe but has been reluctantly received in this country because of the limited immunity.

In most cases, because of local conditions which inject complexities into the situation, a veterinarian should be consulted before any treatment is given.

THE SEVEN HOGS in this battery are being bled and the eighth is being wheeled into place against the wall. Their tails protrude through the wall into a super-antiseptic room where the blood is taken out by vacuum. The hog loses an inch of tail at each three bleedings. The amount of blood taken is closely watched and the animal is released and given a good feed as soon as he shows signs of weakness. Only the healthiest of hogs are suitable for serum production.

In the summer of 1950 more cholera than usual appeared in the hog states, especially in Iowa and Illinois. There were losses even among herds which had been treated. This led to the rather startling rumor that the Communists had tampered with the serum. It now appears that the virus which was responsible for the 1950 outbreaks was not as quickly and completely subdued by the serum used as it had formerly been. Perhaps, like the flu germ, it had developed an immunity, or was in a little different form. Many pigs died from a "mysterious disease," which some say was a new brand of cholera. Veterinarians at Purdue, studying the situation, have suggested the possibility of a new and stubborn cholera virus, and have raised the question of developing new methods of treatment. The U.S.D.A. recommended giving larger doses of serum.

A BLED HOG leaps out of his straight jacket. As a reward he will be given a big feed of corn, which he joyfully attacks, to calm his spirit and revive his strength. He forgets his recent experience and is apparently none the worse in a few hours.

How Serums and Vaccines Are Made

The manufacture of serum and vaccine is big business. After the Ames, Iowa, success in developing the serum, the government patented the process and made it public domain. At first the States made the serum; later it was relinquished to private manufacturers, but control was retained by the government. The present rigid government control insures a uniform product of top potency to the hog raisers of the country.

Serum manufacturers purchase top-notch pigs weighing about 100 lbs.; these pigs must not have been immunized against hog cholera and must be susceptible to it. On arrival at the plant these pigs are placed in special pens and allowed to mingle with calves that are known to be disease free. After a suitable waiting period, the calves are observed for symptoms of hoof and mouth, or other animal sicknesses which might have been transmitted to them by the pigs. If the pigs pass this screening test, they are given a case of cholera by the simple method of injecting 5 cc. of the virus. About seven days after this inoculation, the pigs showing the best characteristic symptoms are bled and the blood obtained from them is returned to the laboratory for subsequent processing into serum, virus, or vaccine. The carcasses are autopsied and all organs checked for pure cholera lesions. The pigs must be free from all other disease except cholera. The carcasses are sent to the rendering house; fats are used for commercial purposes.

To produce serum, the blood obtained from the pigs is defibrinated; that is, it is placed in a shaking machine and thoroughly agitated. This shaking allows the fibrinous matter in the blood to clot. but prevents the corpuscles from doing so. The fibrin clots are removed by passing the blood through a strainer; the remaining virus blood fluid, known as whole-blood virus, is placed in an ice bath to cool it and prevent contamination. The whole-blood virus is then injected, ice cold, directly into the blood stream of immunized hogs at the rate of 5 cc. per lb. weight. (A hog weighing 300 lbs. would then receive 1500 cc., or about a quart and a half of whole-blood virus.) Hogs thus treated are turned back to the pens to rest and feed for eleven days. During this time the animals build up a "hyper-immunity," since their immunity is increased by this procedure. On the eleventh day the hogs are suspended in a sort of metal cradle, wheeled against a wall

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LESIONS on the internal organs are the tell-tale signs of cholera. Hemorrhagic lesions are shown (left) on the spleen. On the right, blood is being taken from a hog by means of a canula knife, which prevents contamination from the air.

HEATED AIR from a portable crop drier is forced through the perforated floor of this shed to cure baled hay in four days.

MODERN HAY MAKING

Flue curing of hay is only 10 years old, but it is already outdated. New methods include heated air systems and the amazing hay crusher.

BY TED PRESCOTT

WHEN man first tamed a cow and taught a horse to carry a load he saddled himself with the job of hay making. During most of that time he made his hay in the only way he knew how, by cutting it and leaving it in the fields to dry before stacking it or hauling it away to a dry barn. But within the memory of the youngest boy scout there have been revolutionary changes in this agricultural art of hay making. It gradually occurred to farmers and research workers that there were faster and probably better ways of removing moisture from hay than waiting for the sun to do it. The first attempts were encouraging; later workers improved and refined old methods and now everything from running hay through a wringer to drying it in the wagon is being used.

This spurt of interest in hay drying has been stimulated by the generally increased interest in grass farming and by the many advantages of artificial drying over the old method. Chief advantage is that the danger of spoilage has been minimized by artificial drying. Hay that has been rained on and bleached by the sun in drying can be so reduced in feed value that the expense of removing it from the field is money lost. Removing hay from the field after a short curing period and finishing it in the barn reduces the danger of rain spoilage. A second advantage of the artificial drying is that more of the nutrients are retained. A third very important advantage is that more of the crop, and the best part of it at that, reaches the animals, since the leaves, which are prone to shatter and be left on the ground with field cured hay, are saved by artificial curing. While only 10 percent of field cured hay would grade U. S. No. 1, more than half of the mow cured hay would fall into this classification.

Ralph Ogden and his farm manager, Bill Lunn, were aware of these facts when they planned their new dairy barn on their Glenoden Farms 50 miles up the Hudson River from New York.

Last summer the countryside around Glenoden was soaked at least once a week from May to August with heavy rains. If the rain was good for the growing crops it was bad for the hay. Very few farmers saved even one cutting. But rain or no rain, the hay mows at Glenoden Farms were bulging at the end of the summer with 450 tons of the finest alfalfa-brome-ladino hay that was ever pushed through a baler.

Glenoden Farms has no long standing record as a champion hay maker. Only two years ago when the main dairy barn burned the catastrophe was blamed on hay, the poorly cured hay stored overhead which had overheated and burst into flame.

Ogden and Lynn set about rebuilding the dairy barn, but before they started construction they traveled to the farm of Herman Snyder, Master Farmer, at Montoursville, Pennsylvania. Snyder was testing a new experimental oil fired drier. He told an enthusiastic story about this hay drier's abilities and two like it were ordered for Glenoden.

The new dairy barn at Glenoden is a one floor steel structure. The specially built hay drying room is 29 feet by 29 feet with a wire floor three feet from the ground. The walls are air tight throughout. Conveyors carry the baled hay from wagon to drying room. Beyond the drying room, outside the barn, is a small annex which houses the hot air furnace fired by a standard sized automatic oil burner. A 36-inch electric fan sucks 18,000 cubic feet of air a minute through the space between the furnace boiler and jacket and the heated air is blown beneath the wire floor of the drying room.

In the drying room bales of green hay which still contain from 35 to 50 per cent moisture are laid on their flat side tight against each other and piled six deep with each layer run crossways of the one below it. Holes between the bales are stuffed with handfuls of loose hay to keep the warm air from escaping save through the moist hay.

The drying air, about 25 degrees warmer than the outside air, is forced upward through the bales and out of the barn with its load of water. The bottom bales dry rapidly and when the top ones are dry the job is done. The newly dried bales are moved into the mow adjacent to the barn and the drying room is ready for the next batch of bales.

On the first and second cuttings at Glenoden, Bill Lynn keeps two mowing machines busy knocking down 15 to 18 acres at a time. The hay is always raked on the day after it is cut and two hours after raking the hay is baled. The drying room is filled, the heat turned on and in four days hay hauled in at 100 pounds to the bale is ready for storage at 50 to 60 pounds. Each drier handles 1100 bales at a time, or a total of 2200 bales every four days. The driers were filled eight times last year with a total of 450 tons for the three cuttings.

A hay making factory such as the one on Glenoden Farms does not come cheaply. The drying units cost $1800 and the total cost varies with the labor and materials used to build it. Made with farm help and making use of the least expensive materials in his buildings a farmer should manage to keep the cost of such a structure under $5,000. This is quite a number of dollars on anybody's farm, but where hay is the major crop and it is needed to give the best of feed to the best of cattle, the hay drier may still be the wisest investment on the farm.

HEATED AIR is forced through the false floor of this hay curing shed.

The cost of power, oil, and labor for drying hay at Glenoden Farms totals $84.33 per 1000 bales or eight and a half cents a bale.

The Value of Good Hay

Cows can give the best answer to questions on the value of fine hay. In the year that Glenoden's Holsteins have been fed heat dried hay their average hay consumption has increased at least 20 per cent. The added protein his hay supplies enables the farmer to reduce the amount of grain fed as well as the percentage of protein in the supplement and this in turn helps absorb the cost of curing hay.

At the same time, production records

WITH THIS INVERTED "V" air duct and forced, unheated air Bob Eifert of Lansing, Michigan, stores hay at 40 per cent moisture. The cured hay is green and leafy.

at Glenoden have climbed. In the test barn where 30 head are milked three times a day, 28 of the 30 animals are making Advanced Registry records over 800 pounds of fat, and five went over 1000 pounds in 1950. In all the years during which the Holstein-Friesian Association of America has been supervising the official production of cows on test, only 120 have ever made over 1000 pounds of fat on three-time-a-day milking.

An even more impressive demonstration of the feeding value of rich hay is found in Glenoden's herd averages for the past two years. The 1949 average, completed before the hay driers went into operation, was 14,075 pounds of milk and 532 pounds of fat for 53 head. This was the highest average ever reported on a herd of 50 head or more in their classification.

The following year, 1950, feeding the new hay, 57 head averaged 608.9 pounds of fat and 16,415 pounds of milk, a world record for herds of 50 head or more regardless of the number of times milked daily. The year, however, was an unusually good hay-making year all over New York State, and DHIA figures showed an increase in the average production of all cows on test.

Bill Lynn says, "The hay was the only major difference in our method of handling and feeding the herd." If we credit the higher quality for less than half of this increased production, or 1000 pounds of milk for each of the 57 cows, that's 57,000 extra pounds of milk. At $4.50 a hundred this made an added farm income of $2,565, which was considerably more than the extra cost of drying their entire crop of hay. And they had surplus hay to sell.

Summing up the advantages, we may credit this hay with higher milk production, lower grain cost, less fire hazard, and more hay saved per acre. On the other side we have an extra labor requirement in the one added handling from drier to mow, plus a higher investment and operating cost. Balers do not work as efficiently on the heavy green hay; bales are loose and more difficult to handle after losing from 30 to 50 pounds of their initial weight.

With a few labor-saving variations most hay is still made with a mowing machine and a prayer. Today's farms equipped with radios get closer weather forecasts than grandfather did. In the field, hay loaders, field choppers and balers have removed much of the backache from the job; but bad weather still spoils hay, just as it has done down through the centuries.

For safe storage and good quality, hay must be reduced in moisture content from its 75 or 80 per cent at cutting time to less than 20. The farmer who gets the maximum value from his hay crop cuts it at the right time, drys it and puts it in the mow before sun and the rain can take their toll. This calls for faster methods of drying than those provided by nature.

The principle of mow curing hay is a simple one. The farmer sees the same principle applied on Mondays when his wife hangs the wash out to dry. The air picks up the moisture from the clothes and carries it off.

ONE OF THE LATEST THINGS in hay making is curing it on the wagon. Hay with 35 per cent moisture can be reduced to 20 per cent moisture in less than an hour.

FARMERS WITHOUT a drying shed can stack baled hay on a slatted platform, tie a tarpaulin over it, turn the hot air on and make high quality hay in wet weather.

When Did Mow Curing Start?

Mow drying systems were developed about the same time by TVA engineers in Tennessee and by Agricultural engineers at the Ohio State University. The two systems are much alike; down the middle or along one side of the mow floor is a large air duct and branching from it are numerous smaller wooden tunnels through which air is forced at uniform pressures. These two systems will cure hay satisfactorily and while they are in wide use today, they are already considered somewhat old-fashioned in the light of new mow drying developments.

New mow drying systems are generally tailored to fit the old barn. Few farmers can afford a new barn for curing hay, and most existing hay mows can be fitted to the task.

But the farmer planning to install a mow dryer must first check his barn for a few essentials. It will need an airtight floor. Well laid tongue and grooved lumber is best. If the floor has a few holes they can be repaired with sheets of metal. If the floor is reasonably good but not airtight, roll roofing laid over it can make it temporarily satisfactory. The floor must be strong enough to hold the heavier hay which will be mowed with higher moisture content.

The barn must also be equipped with doors, windows, or roof ventilators to allow the moisture laden air to escape after it has been forced through the hay. These outlets should be placed so that the damp air will not be drawn back into the barn by the fan.

The layout for the system will depend on the kind of hay to be cured, the size and shape of the hay mow, the rate of filling, and the speed with which the farmer wants to dry his hay. If he owns a

THE FORAGE HARVESTER cuts, chops and loads hay in one operation. If used for hay making, wilted hay is gathered from windrows.

large hay mow he may find it best to install two or more drying systems instead of one large one.

The propeller type fan has proved most satisfactory for hay curing systems where electric motors are used because the horsepower requirements remain more constant. Only on a few larger installations is the higher priced tube-axial or backward curved centrifugal fan justified.

Where heated air is not used the fan is housed in a special fan house built inside the mow. The fan house must be airtight except for the fan opening and the air duct on the outside of the barn. It is generally built five feet long and its other dimensions depend on the size of the fan chosen for the system. The fan should be protected from weather. A wire screen covering it will keep the fan from acting as a sausage grinder on unsuspecting birds and adventuresome cats.

The Air Ducts

The tunnels which carry the forced air offer peculiar problems all their own. Early in the development of mow dryers the engineers realized that the tunnels themselves offered resistance to the air and lowered the efficiency of the fans. Engineers at Virginia Polytechnic Institute figured out a way to help eliminate this wasted energy.

The Virginia engineers retained the main tunnel down the center of the hay mow floor in their newly designed system. But instead of the numerous smaller branch tunnels they built a slatted floor over the whole hay mow. A specially designed slit along the bottom of the tunnel discharges the air from both sides so

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BY GEORGE LAYCOCK

CROP INSURANCE

The modern farmer has a large investment in his crops and his risk is high. A new plan now offers him crop insurance.

WHEN a roaring wind sweeps out across a farm and lifts the barn from its moorings the farmer usually gets a new barn from his insurance company. If the barn falls on a couple of his milk cows, his insurance might cover them also. And if in the same wind storm his favorite maple tree crashes across his favorite pickup truck the insurance company can be tapped for that damage too. But if, as the cyclone whips on across his farm, it levels and ruins his heading wheat crop—that's another story.

Insurance on growing crops is still not on the market in most of the country. In an increasing number of counties, however, the farmer is being offered crop insurance through a government program that is just now, after 10 years, beginning to look good to farmers, government administrators, businessmen and the public in general. Crop insurance, like love, is here to stay.

It (crop insurance that is) has proved its worth to numerous farmers in widely scattered parts of the nation. In 1945 Lee Smith's wheat crop on his Nebraska farm yielded only six bushels to the acre. He had handled the crop the same as ever and had spent just as much money in producing it. But there was no crop insurance available that year and Smith carried the loss himself. But in 1949 he had another bad wheat year and crop insurance saved him the cost of his investment. His wheat wintered poorly; then the first week in June a hail storm cut the yield on his poor stand to reduce his final yield to two bushels an acre. The previous year he had harvested 34 bushels to the acre. His Federal Crop Insurance policy paid him $19.40 on every acre planted to wheat in 1949 and he used this payment to plant another crop the following year.

In 1950 two counties in Indiana paid partial losses to one out of every five wheat farmers.

In 1948 severe drought swept the wheat lands of the West and practically wiped out wheat crops in two Montana counties. These counties, however, had a good crop insurance program and the adjustments paid to the farmers kept business going normally. Without the insurance both farmers and businessmen would have known hard times.

Southern farmers are getting valuable protection on their cotton, a high risk crop, as any southern farmer will tell you. Much of our annual tobacco crop is protected by insurance. And in areas where the farmers rely on a wide variety of crops for their incomes, they can, if they live in the right county, get an insurance policy to cover most of the crops they produce.

The insurance that these farmers are buying to cover some 27 different crops is issued by the Federal Crop Insurance Corporation, a branch of the Department of Agriculture. The Government got into the crop insurance business in 1938, and, discounting a few interruptions, the program has been gaining momentum every year since.

In addition to Federal crop insurance, farmers can buy hail insurance on crops from private companies.

There is a good reason for the shortage of private companies selling crop insurance today; they've tried it and found it a bad gamble. As early as 1889 one Minnesota company started writing insurance to protect the wheat crops in its area from all the usual hazards to which a wheat crop is exposed. The venture proved a failure partly because of poor management and partly because the premium charged was too low. The company gave up the job.

It wasn't until 1917 that two other companies bravely ventured into the wheat

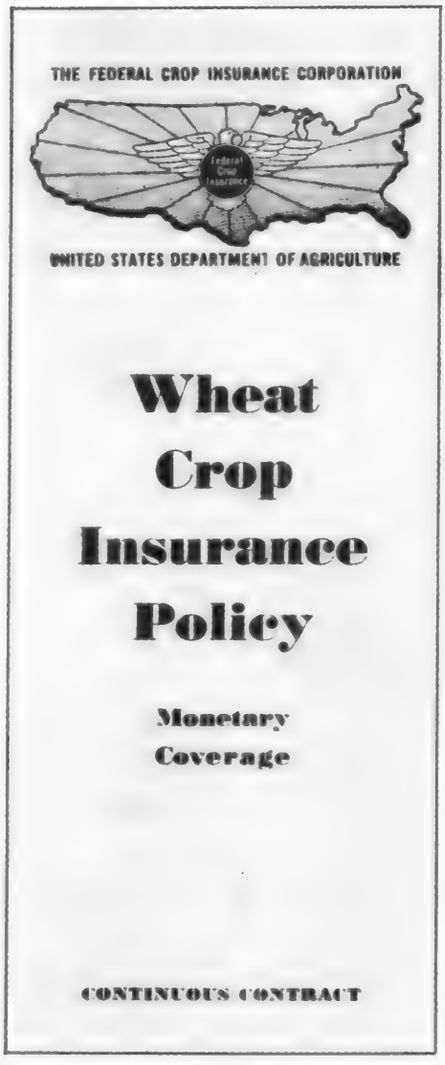
A GREAT PLAINS wind storm does more than swoosh sand down the farmer's neck, into his eyes, ears, and shoes; it robs the top soil from around his growing crops and even covers the crops before they have matured. During the Dust Bowl days of the early thirties the hapless plains farmer lost both his soil and his investment in the year's crop. Today his crop insurance policy offers him protection against loss of his investment from practically every natural hazard.

TORNADO

CORN BORER

BOLL WEVIL

CROWS



A CROP INSURANCE POLICY, such as this one, offers the farmer protection as long as he pays his annual premiums. The USDA offered its first policies in 1939 when it insured wheat. Premium rates are established separately for each county and are eventually changed if experience proves them too high or too low. The Government now insures 27 crops.

insurance business only to back out of it after heavy losses in Minnesota, North and South Dakota, and Montana. There was a heavy drought that year, and tacked to this catastrophe were the companies' systems of continuing to write insurance after any farmer could plainly see a crop failure in his fields. This permitted farmers to rush to town in the face of disaster and take out insurance policies on their wheat. The companies did a lot of business that year and lost a lot of money.

And in 1920 and 1921 the Hartford Insurance Company, long a big name in insurance circles, sold crop insurance. But this company, like those that had gone before, had little experience on which to base its newborn insurance program. It collected eight hundred thousand dollars in premiums and paid out two and a half million for crop losses, enough to make any company look around for more profitable fields.

But the farmer still felt the need for insurance to cover his high risk enterprise, and agricultural leaders both in and out of the government, were searching for a working plan for offering him this insurance. With nothing but failures recorded previously in crop insurance ventures, the government's reluctance to enter the field was understandable. And when it finally did start feeling its way around in the insurance business it did so gingerly, like a farm lad dipping his big toe into a springfed creek on an April morning.

In 1936 the Bureau of Agricultural Economics had started active research on the problem of a workable crop insurance program, and two years later a bill passed by Congress gave birth to insurance on wheat. The following year this insurance was offered to farmers in the wheat growing regions of the country. By 1942 the experience with wheat was still not too promising, but Congress added cotton as a crop which could be insured. Federal Crop Insurance administrators soon learned that of all the crops they deal with, cotton is the most difficult to insure. In 1944 all crop insurance was halted by Congress, but the program was revived the following year for flax, wheat, and cotton on a national basis, as well as for corn and tobacco on an experimental basis. Whether the whole idea would eventually work or not was still anybody's guess and there were those pessimists guessing it wouldn't. Since that time, however, the program has been spreading gradually into new counties in accordance with limits set by Congress. In 1950 crop insurance invaded 238 new counties, and the number will grow gradually for at least the next three years. Then the whole problem will be tackled once again by Congress to see whether it is working out on a business basis and should be expanded.

Across the country in 1950 there were 624 counties with crop insurance programs, some working more smoothly than others, but all struggling to keep themselves in the black. As it spreads the administrators compile new statistics on which they can base their premium costs, and the amounts of coverage which should be offered on a crop. And it is only on the basis of sound experience over a period of time that an insurance program can operate with a degree of safety. If the government had plunged into the insurance business on a national scale it would have stood as good a chance of failing as did the pioneering private companies.

How It Works On The Farm

At this point the farmer leans back in his chair and thinks to himself, "This crop insurance idea looks like a good thing. Every year I invest in seed, machinery, labor, fertilizer, spray, and harvesting equipment and I never know from one week to the next how much I'll get back on the investment. Maybe it will be an average year and I'll make out, and then on the other hand maybe it will be too wet, too dry, too cold, too hot, or any one of a dozen things and I'm out a handful of cash. Now if I could protect that investment I could be sure of having enough to plant next year's crop and in the long run I would make my profit."

Then he asks himself how he should go about getting insurance on his crops. And to find out let's follow the footsteps of an Illinois farmer, whom we'll call Carl Betz, as he goes about getting his corn crop insured.

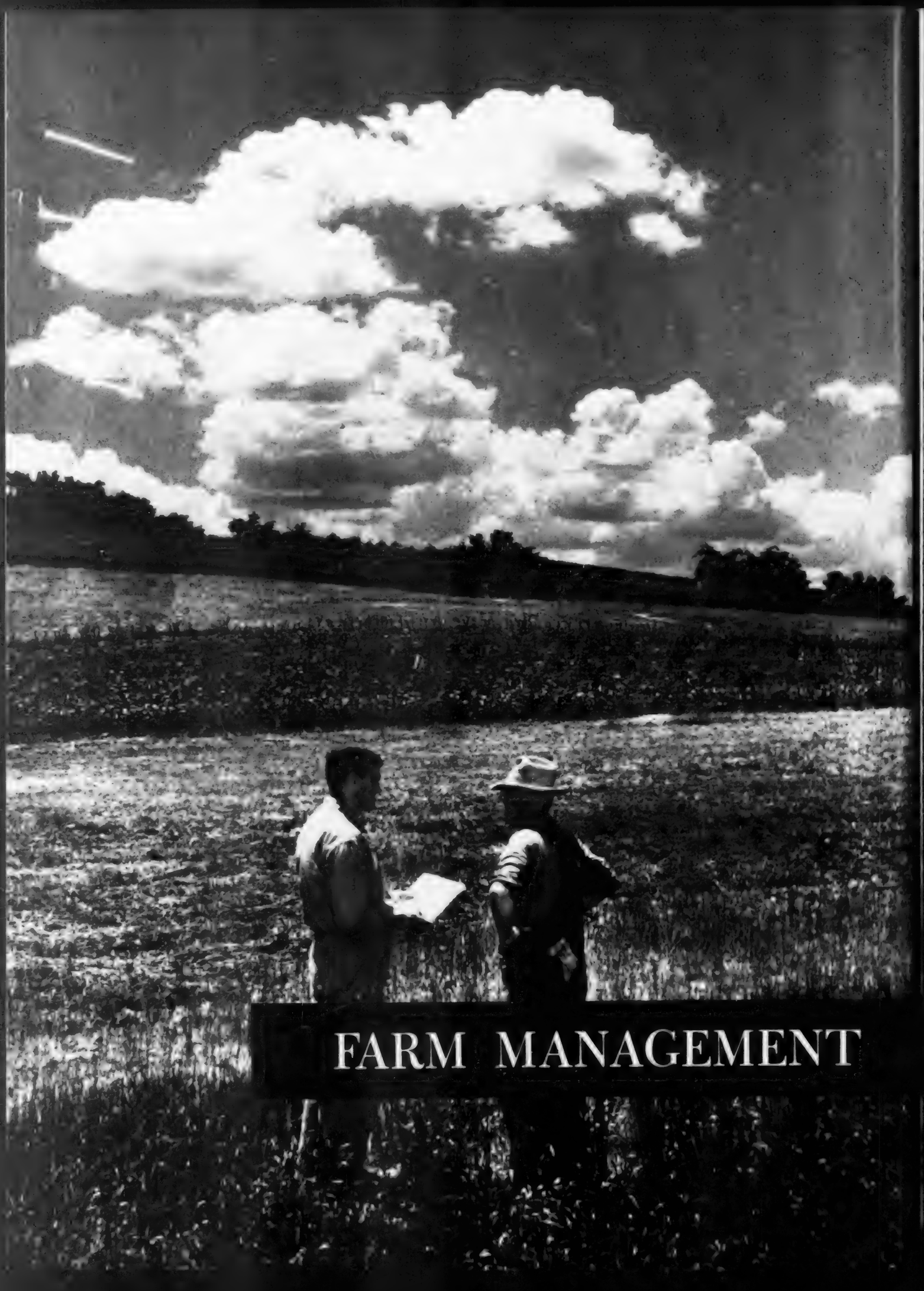
Betz goes to the county seat and stops in at the Production Marketing Administration office, the old AAA. He learns here that his county does have an insurance program protecting corn. He learns too that corn is the only crop he can get insured in his county. And this is the way it is in most counties that offer crop insurance: only one of the major crops can be covered. That, he finds, is because the program is still young and as time goes on there will probably be insurance available on his soybeans and other crops. Usually the crop insured is the one which means the biggest money return to the county each year, or involves the greatest risk to the grower.

Betz also learns that his insurance policy will cover only his outlay in producing the crop. His crop is now protected against destruction by flood, hail, wind, frost, freeze, winter kill, lightning, fire, excessive rain, snow, wildlife, hurricane, tornado, insect infestation, plant diseases, and other unavoidable causes of loss which the Board of Directors may decide to include. His crop is protected through the time of harvest. The policy is calculated to cover all or a major part of the cost of seed, fertilizer, labor, machinery depreciation, spraying, and harvesting. It does not guarantee him a selling price, a practice which private companies found unsound. Markets fluctuate too fast for an insurance company to predict what prices will be at harvest. In addition an insurance policy covering the selling price of a crop could encourage bad farming practices. For regardless of how sloppy his practices of planting, fertilizing, or harvesting, the farmer would then be assured the average income for the crop in his county. And crop insurance to be successful on a national scale must encourage wise land use and not poor farming practices.

The cost of production of Betz's corn crop is figured on the county wide average of producing the crop in his county. The Federal Crop Insurance Corporation, after examining his farm can refuse to accept his application if it considers his land or farming methods too

(Continued on page 100)

FARMERS can generally move their livestock to a high spot in flood times. Their growing crops, however, are submerged and lost unless the owner has crop insurance to protect them.



FARM MANAGEMENT

FOR HIRE

BY W. F. PATTEN

Professional farm managers were the first to bring together science, business, and the green thumb on a large scale on the American farm. The absentee landlord has made them prosperous.

THE trunk of a farm manager's car has more odds and ends in it than the back counter of a general store at Christmas. At least that is what Dave Bailey thought as he made room for a soil auger beside a grain probe that was tucked in between a tripod and the spare tire. The labeled cartons of soil samples were in a cardboard box that had to be muscled in with two other boxes filled with the latest type rat poison called warfarin, a theodolite, a bottle of powder for making rough moisture tests on stored grain, a dehorning tool, a lens for inspecting grain, a package of bookkeeping forms, a steel tape, and a horse shoe. The horse shoe must have been there for luck—it had been years since there had been a horse on the Lovens farm where he had just taken a soil sample, or on any of the other farms he managed. The other items might be found in any farm manager's car; they are the tools of his trade.

Bailey closed the lid of his trunk and said goodbye to Bill Nichols, the farm foreman. He promised to come back and discuss fertilizer needs as soon as the soil samples had been tested.

Bailey is one of the hundreds of professional farm managers who have become so much a part of the agricultural picture since the early 1930's. Time was when the idea of farm management as a separate part of a farmer's job was something strange and new-fangled. The idea of a professional manager who never touched a plow or shucked an ear of corn was downright preposterous. Agricultural thinkers, however, were trying to break down the job of farming to show that it was made up of many separate skills, just as their colleague, S. M. Babcock, was demonstrating the component parts of milk. One of their first tasks was to establish some method of determining costs and true profits. At this time, cost and profit figures were not even available as an economic test of such experiments as crop rotation. Leading scientists in various parts of the country were questioning and gathering information attempting to find the best approach to this problem of management.

In 1906, one of the scientists, Dr. W. J. Spillman, a wheat breeder and re-discoverer of Mendel's laws of heredity, wrote a paper in which he outlined the concept of management as an important part of the job of farming. Among the readers of the article was a sophomore at the University of Missouri, D. Howard Doane, who was so impressed by it that he wrote to Dr. Spillman and asked if he could contribute to the study. Spillman urged the youngster to make a study of the management practices of farmers in Missouri.

Doane worked at his assignment each summer until he was graduated and then continued the project as a post graduate study. In 1909, he received an M.A. on the basis of a book, "Sheep Feeding and Farm Management" and was asked by the University to start the first Department of Farm Management in America.

Feeling the need of laboratory work to go with his courses, Doane convinced several Missouri farmers that they should allow him to work out a management plan for them. Missouri farmers being what they are, these plans had to be workable and they had to be acceptable to the farmer—they were tailored to fit the farm and the financial ability of the farmer to swing them. In return for the finished plan, the farmer agreed to follow it carefully, to keep records, and to hold a field day at the end of the year to discuss results and criticize the plan.

In six years, Doane was able to show that the addition of outside management to a farm paid off in greater returns for the farm owner. He announced to his startled associates that he was going to leave the University and go to work as a professional farm manager. To their arguments Doane replied, "If a management plan increases the profits, and it does, farm owners will pay to have plans worked out for their farms."

Doane's associates were amused to note that the usually level-headed farm management teacher had overlooked a key point: his own department was doing a farm management job free for as many as 10 and 12 farmers a year, so why should any one pay to have the work done? Despite this apparent flaw in his plans, Doane left the University in 1916, and began working as a farm manager for a bank. This job lasted until 1919, when he organized the Doane Agricultural Service, a farm management organization which has since grown into a corporation employing some 200 workers and offering management services from Canada to

PROFESSIONAL FARM MANAGERS make an overall plan for the farm and see that it is carried out. A farm where manure stands in the open and the valuable plant foods leach from it, or where a neglected drainage system spoils good land, calls for a manager to act as a gadfly and insist on efficient farming methods.

SHOCKS OF CORN AT THANKSGIVING may be picturesque, but the old-fashioned hand method of corn harvesting is hardly economical. A farm manager would investigate the possibility of hiring custom picking or purchasing a corn picker to do this labor consuming job, for the efficient use of man power and of machinery is the life blood of his profession.

Mexico, and from the Rockies to the Ohio River.

So far as is known. Doane was the first professional farm manager. He didn't remain the only one very long, for others saw the need for trained men in this field. The profession, however, didn't take a real spurt until the depression.

As foreclosures mounted in those bleak days and banks and insurance companies found themselves with more and more farms on their hands, they had to find competent men to manage them. Competent farm managers became a class apart—they were among the few whose services were in demand. As recovery was achieved and the banks liquidated their farm holdings, the managers went out and began campaigning for clients. Some managers banded together into companies, some have continued working as individuals, and some have become specialists in a branch of management.

Management at Work

David Bailey, who drives the gadget filled car and who manages the Lovens farm, is one of the new generation of managers. In his thirty-eight years he has

packed behind him a degree from the College of Agriculture of Ohio State University, a nine year stretch as County Agent, and five years as a professional manager. Employed by Opekasit, Inc., one of the larger management companies, he manages 12 farms. The division of labor within the company permits him to turn over some of the record keeping, purchasing, marketing, agricultural engineering, construction, ditching, tiling, and other details to specialists while he devotes himself to managing the actual operation of the farms. The Lovens farm is operated on a direct basis, that is, the management company employs the farmer in the name of the owner as well as furnishing management; some of the other farms on his string are tenant operated. The record of this farm gives a good idea what management can do.

Mrs. William Lovens came to the management company to secure advice on the purchase of a farm as an investment. The farm that she finally selected was a 180 acre general farm in Warren County, Ohio. At the time of purchase the farm had 140 acres of tillable land in a low

THE LAYOUT OF A TERRACE calls for engineering skill and practical know-how. The manager estimates the value of terracing and then draws on his own training or on that of his associates to put it through. Properly managed pigs will gain faster and more will reach market than those left to manage themselves in the fenced-in wallow shown below.

state of fertility. The buildings were unpainted, their roofs were in bad shape, and the foundation of the barn needed replacing. The farm had more than its share of weeds and trash; fences needed rebuilding, and even the lane leading back from the hard road had a somewhat demoralized look. The farm was owned by the widow of the farmer who had once operated it successfully. For years, however it had been in the hands of a tenant, leased on a 50-50 basis. Neither the owner nor her children visited the farm often.

"I didn't make the appraisal on this farm," Bailey says. "As a matter of fact I didn't come with Opekasit until a couple of years after Mrs. Lovens bought the place. Since the former tenant didn't keep careful financial records, we didn't have any accurate idea as to the earnings of the farm. All we knew was that the owner was very happy to sell the place at far less than farms in that neighborhood were bringing. Admittedly the farm was run down, but the company saw in it a good potential and so did Mrs. Lovens.

The first job of management was to make an overall plan for the operation of the farm. This required a most careful survey of the farm as it was and a projection of the farm it could become. It required a plan of change and of operation that would improve the farm and bring a financial return to the owner. Above all the plan had to please the owner and be in line with what she was able to do financially. Soil tests were made, bids were secured on the building repair work, the farm drainage system was studied, estimates on the fencing job were made, and the whole rebuilding program was incorporated in the operational plan for the farm. Mrs. Lovens went over the whole plan, had it explained to her in detail, and approved it. "From our point of view, it is absolutely essential to have the client completely sold on the farm plan," Bailey says. "Because she was enthusiastic about the plan, every time we finished a job, like painting or working on a section of the fence, she felt that we had passed another milestone on our way to bringing the farm back. If she hadn't agreed with the plan she might have felt that each job done was just another bill, maybe even a needless one, to be paid. The plan covered the whole operation of the farm from land use and a livestock program to the management of labor and the installation of a bathroom in the house."

Land Use

The crop and fertilizer program, like every other part of the farm plan, had to be fitted to the needs of the owner. She had invested heavily in the farm and it was necessary to put a squeeze on the land for a year or two in order to keep her financially solvent. A rotation of corn, beans, wheat, and meadow was started. This was not too different from the rotation then in effect, but fertilizer was increased from the 100 pounds of low analysis fertilizer an acre for corn and 125 for wheat that the former operator had used, to 200 pounds of 2-12-6 for corn and 250 pounds of 0-14-7 for wheat.

Once the first difficult financial period was passed, the rotation was changed to add a second year of meadow and fertilizer was increased to 400 pounds of 0-20-20 for wheat and 300 pounds of 3-18-9 for corn.

Two simple jobs, which were done quickly and at little expense, brought spectacular results. A day spent cleaning up trash and opening a ditch brought 20 acres back into production. They proved, perhaps because of the long rest, to be the best crop land on the farm. Repairing and cleaning tile started drainage on a 15 acre plot, that had been completely stopped, and in addition helped the drainage on a 20 acre piece. The tile system which was made to function again had been installed at a cost of $1500, but had been allowed to become inoperative through neglect.

The farm records showing the yields for the past five years as compared with the yields before management was applied to the farm are significant. Wheat, which yielded 15 bushels to the acre under the old tenant, has averaged 29 bushels for the past five years. Soybeans, which were not grown before, yield 28 bushels to the acre. The corn yield has been raised from 46 bushels to 72 bushels an acre.

Livestock Program

The former tenant kept 10 brood sows and sold 100 to 110 pigs a year. His system was free and easy; he didn't vaccinate or clip teeth, and, except for castrating, the only attention the pigs received was from the sow. For sanitation he depended on the soil bacteria, on the theory that if it was good enough for Selman Waksman to make streptomycin from, it was good enough for his pigs. The feeding program was of a piece with the care; the sows were fed corn, water, and salt—their protein supplement consisted mainly of any snakes they might catch.

The manager had a corner of the barn concreted and divided into farrowing pens that could be kept clean. He replaced the ten sows with eight and insisted on proper care and feeding. Under this system 120 pigs were sold from the eight sows. The number of brood sows has been increased to 13. The spring litters in 1950 averaged 7.7 pigs, marketed from each sow in 179 days at a weight of 203 pounds. "This doesn't set any record," Bailey admits, "but it is a good, consistent production that makes money for Mrs. Lovens."

The four dairy type cows that the tenant took with him were replaced by 12 beef cows to make use of pasture and produce a calf crop.

With a change in ownership came a change in the farm labor situation. The former tenant left and was replaced by a salaried employee. Under the former tenant two men, the tenant and a hired man, operated the farm. Two tractors with their related equipment had been used to do the job except for corn harvesting. Corn had been cut and shocked.

Under the new management, one man was put on the farm and provided with a single tractor with related equipment and a portable elevator. Corn picking, trucking, and hay baling are done with the help of custom operators. This extra hired labor amounts to a maximum of 250 hours a year.

Certainly the work that Bailey does as manager should be counted in with the labor that it takes to run a farm as well as that of his specialist associates. His visits to the farm and supervision work there, his planning for the farm, his work as sales and purchasing agent, and the paper work that he has done are figured at 250 hours a year.

Buildings and Fences

Some of the buildings were in such bad shape that they required immediate repair. The barn, for instance, had to be jacked up and a new foundation built under it. Repair work that could wait, like the barn roof, however, was spread over a five year period. Fields were rearranged so that there was less fencing needed and some of the fences that were removed were salvaged. The rest of the fence repairing has been spread over five years. The house has been painted and the roof repaired and water brought into the house for a kitchen and bathroom. Putting water under pressure for this project also made it possible to have running water at the farrowing pens, to the hog feeding floor which was built near the barn, and at the watering tank for the cattle. Some of this work would come under the heading of capital improvement, but a large part of it would qualify as repair to existing structures and could be written off on income tax. Careful records were kept to satisfy the inquiring mind of the Collector of Internal Revenue

NIGHT WORK on books, often skipped by the tired farmer, is routine for the manager.

(Continued on page 121)

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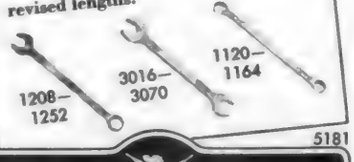

5181

PROTO TOOLS
LOS ANGELES

CHOLERA AND THE VACCINES

(Continued from page 67)

with their backsides protruding through a hole, and bled. An inch or two of the tail is cut off, a rubber tube slipped over the stump, and the blood drawn out by vacuum. The hog is watched carefully, for he weakens fast. The ordeal usually takes twenty minutes after which the tail is sealed with a hot iron, and the hog is released and given a reward of corn and barley. A week later after the hog has replenished his blood supply, the operation is repeated. The tail is cut a little shorter. From a week to ten days after the second bleeding a third is taken. By this time he is about out of tail and can be bled in this manner no more. After another period of rest he is bled from the throat. This is fatal, and his carcass goes to the butcher, provided it is passed by the inspector. All carcasses of serum hogs are Federally inspected either at the serum plant or another Federally inspected plant.

The blood is iced and poured into a sort of mix-master and the fibrin clots removed. A bean-salt extract is added and this mixture is centrifuged to separate the corpuscles. The remaining fluid, which looks like cherry bounce, free of fibrin clots and corpuscles, is known as clear serum; it is pasteurized, tested on live animals, bottled, and distributed.

The virus used commercially in conjunction with the serum is taken from the general supply afforded by the pigs. However, only those animals falling within certain weight limits and showing the best characteristic symptoms are used. A phenol preservative is added to the blood obtained from these animals and the product is tested on live animals and pigeons (which are susceptible to certain of the swine diseases), bottled and sold.

In crystal violet vaccine production the pigs are graded even further as to weight, characteristic symptoms, and strong cholera lesions. Only those meeting the most exacting requirements are used. After the pigs have been given a case of hog cholera, they are bled with a special instrument known as a "canula knife." This knife permits the blood to be withdrawn without coming in contact with the air, thus lessening the possibility of contamination. The blood is agitated and the fibrin clots removed; it is then sent to the laboratory where an attenuating solution consisting of crystal violet and glycerin is added to reduce the virulence of the virus. The attenuated blood solution is incubated at 37° C. and kept in homogeneous suspension for two weeks. At the end of this time the blood from each pig is tested separately for sterility and mixed in serial lots. The serial lots are again tested for sterility and for safety and potency. The vaccine is then bottled for commercial distribution. The preparation of B.T.V. vaccine is somewhat more complicated, the tissues of certain organs

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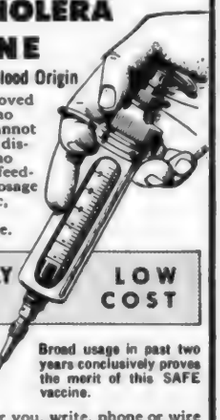

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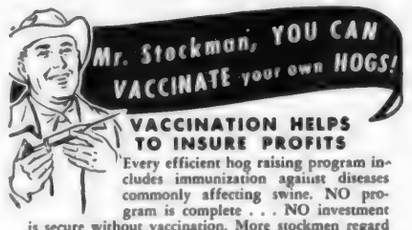

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Farmers everywhere like the extra traction and longer wear they get from B. F. Goodrich Power-Curve tires. On this tire each high, tapered cleat has an arrowhead nose that digs right in. The curved cleats are high at the shoulders, high at the center—actually higher at the center than the cleats of the two other leading makes.

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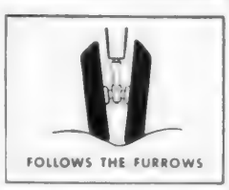
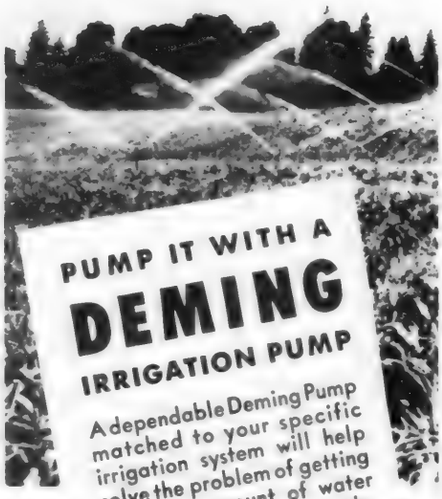


This new type front wheel tire first made its reputation in the lister corn country. Now farmers everywhere want it. It follows the furrows or rides the ridges. Protects your crops. Makes steering easier. Tread is specially compounded for extra-long wear. See the BFG retailer.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

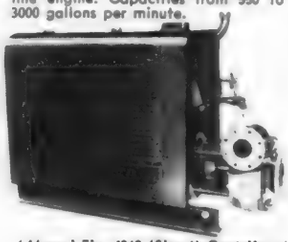

PUMP IT WITH A
DEMING
IRRIGATION PUMP
A dependable Deming Pump matched to your specific irrigation system will help solve the problem of getting the right amount of water at the right time for the right result.

Typical Types

Fig. 4412W (Sizes 1½A and 2½) Deming Centrifugal Pump close coupled to 7.5 H. P. Wisconsin single cylinder engine. Capacities up to 300 gallons per minute.

(At right) Fig. 4700 Deming Turbine Pump for shallow or deep wells 4 inches or larger (inside diameter). These pumps also have many advantages for pumping from lakes, ponds, rivers, canals, etc. Capacities vary from 12 to 3500 gallons per minute.

(Above) Fig. 1809 Deming "OILRITE" Horizontal Piston Pump with electric motor drive. Also available with gasoline engine. Capacities from 550 to 3000 gallons per minute.



(Above) Fig. 4362 (Size 4) Centrifugal Pump close coupled to gasoline engine. Capacities up to 1200 gallons per minute.

Send for Bulletin No. 800

Various types of Deming Irrigation Pumps and related sizes, ratings, performance tables, and other helpful data are included in this illustrated Bulletin No. 800. Write for FREE copy.

THE DEMING COMPANY
510 Broadway • Salem, Ohio

being used instead of the blood. The resultant culture is attenuated by adding eucalyptus oil.

Wherever hogs are grown in the world, there you will find cholera. This calls for serum, virus and vaccine. The quantity of serum produced in this country during the past decade constitutes an impressive record. The serum and virus producers have kept pace remarkably well with the fluctuations in the nation's hog population. The estimated value of the nation's hogs was a billion and a quarter dollars in 1949. In the light of these figures, the current, nominal cost of preventing hog cholera in each animal (from 60 cents to $1.50 per animal), seems insignificant. Likewise, each dose of the serum-virus injection, when compared to the total annual serum output, seems unusually small. Yet every dose of the serum and virus represents a sample of the most effective means of preventing the third most destructive of the animal diseases.

It is practical, inexpensive health insurance to immunize all swine with one of the immunizing agents, selecting the one which will best fit the needs. After treatment the hogs should be kept in clean, dry quarters, and the breeder should limit the amount of concentrate in the rations and place the animals on a restricted or reduced diet for two weeks. All contact with non-vaccinated or non-immunized swine should be avoided for three weeks.

During an outbreak, if there are no complicating diseases, treatment should be followed on all animals that are not visibly sick and that have temperatures less than 103° F. Hogs in the very early stages of the disease, that show no sign of infection except a rise in temperature, may frequently be saved by injecting large doses of serum, but when the disease is well advanced, no treatment is very effective.

Canada has all but eliminated cholera; there is no reason why this can't be done in the States. However, confusion among the experts, the serum makers, and government researchers on symptoms, methods of vaccination, and the results obtained by the various methods, has filtered down to the farmer to confuse him too, and put off the happy time when he can be shown a straight course, easy to follow, on which everybody agrees.

GEESE, GOSLINGS, GOOSE EGGS.....

Safe shipments anywhere

Bulletins, magazine on breeding, hatching, rearing, marketing.

PEYTON GOOSE FARM
ROUTE 2A, DULUTH, MINNESOTA

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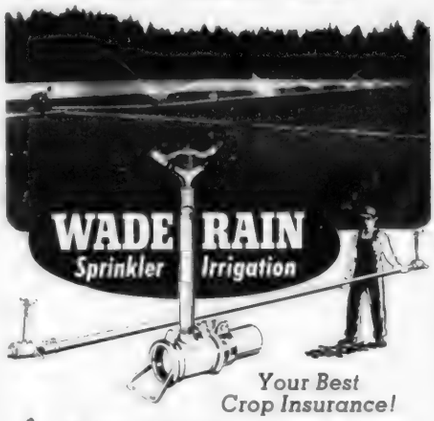

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Saves You Time and Labor
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FREE *Field Layout Service*

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America's oldest and most profitable breed of cattle offer greater size, fastest gains, quiet, easy-handling dispositions and widest adaptability. Check modern Shorthorn performance records including carlot and single steer Grand Championships OVER ALL BREEDS. Write us for illustrated literature and lists of member-breeders who can supply you with seed stock.

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DAISY *Cattle Markers*

DELIVERY ONE TO THREE DAYS POSTPAID

No. 21—FOR NECK. Adjustable chain. Numbered both sides. $13.25 per dozen.

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No. 25—DOUBLE PLATE ALL CHAIN MARKER. SOLID BRASS MARKER PLATES, numbered both sides. Chain is brass plated. Weight, 1 lb. each.

Price: $16.75 per dozen

Sample mailed for $1.00. Write for folder.

GOLDEN ARROW FARMS
Dept. 11, Box 7 Huntington, Indiana

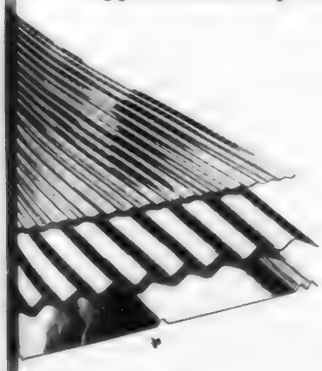
Look to the Sky

for some facts about your next roof

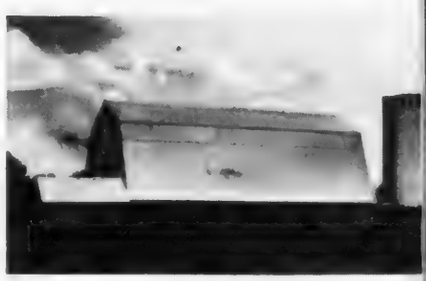
The skin on those planes streaking overhead is aluminum, in many places no thicker than the aluminum you'll see on millions of farm roofs. Aluminum serves best for both planes and roofs because it stands up to the weather, is strong, economical and unaffected by rust. Think of this the next time you plan a farm roof.

Because rearmament needs must come first, our supply of aluminum farm roofing is limited, and is being apportioned fairly among Alcoa Dealers. Because a new roof is a major purchase, you will want all the facts before you buy.

To help you, Alcoa offers free booklets which give full information on Alcoa Roofing Sheet, types, sizes, coverage tables and accessories; where to use it on the farm and how to apply it for best results and long life. For your copies, mail the coupon below. For information on prices and delivery, consult your Alcoa Dealer.



ALCOA
ALUMINUM
ROOFING SHEET



"THIS ALCOA ALUMINUM ROOF has stayed tight in windstorms that blew down buildings. In three years I've never had a leak or need for repairs", says Mr. F. E. Meyers up in Castile, N. Y., where the winters are long and cold.

Farmers everywhere tell us that Alcoa Aluminum makes the best roof they've ever had. Notice how the aluminum roofs in your neighborhood stay good looking without paint or repairs; never have ugly rust streaks; give lasting protection.

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BOWSHER PORTABLE FEED MILL

Grinds palatable, digestible cobmeal, shelled corn or corn cobs to any practical fineness without dust. 150 to 250 bu. per hour

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MUSSER FORESTS, Inc.
Indiana, Pa.

MODERN HAY MAKING

(Continued from page 71)

it will be forced upward through the slatted floor and the wet hay above. Holes in the top of the tunnel send air through the hay directly above it. The size of the air discharge crack in the tunnel varies with the size of the mow. The slatted floor is built in sections for easy storing. When in place they are laid on joists high enough to be above the air discharge slits. The slats are made of one-by-three-inch lumber spaced six inches apart. The same type of floor is now being used for curing hay with heated air.

The farmer who owns a high, narrow mow usually builds an air duct shaped like an upside down "V" which he uses without a slatted floor. Many new mow curing systems employ a duct slatted on top and sides and have no slatted floor.

The farmer installing a hay curing system selects all of the parts separately and combines them to fit his own barn and serve his individual needs. With the help of his county agent, equipment dealer, or farm management service he decides which fans, motors, types of flooring, air heating systems and flues he needs. Because each installation is tailored to the farm it is difficult to give the cost of an average barn drying system or to tell its capabilities.

Approximate Costs Of Forced Air Systems For Curing Hay In Existing Barns

Size of Mow	Cubic feet of air needed per minute	Cost of fans, motors, belts, pulleys for forced, unheated air	Cost of floor and drying unit for heated air system
24x30	11,200	$525.00	$1100.00
30x30	13,650	550.00	1400.00
30x35	16,800	650.00	1450.00
39x36	21,500	700.00	1575.00
45x36	25,100	850.00	2300.00

These approximate prices will vary with the local costs of material, amounts of farm labor used, and the makes and models of equipment chosen.

Installations have ranged from $500 to $1500 for the original investment, with the average well under $1000. The most common size of system uses a 5 horsepower motor.

The average operating cost on 27 farms surveyed in 1946, including equipment, cost of installation, interest, depreciation (10 years), insurance, and power, was $1.70 per ton of hay cured. The larger the operation the lower will be the cost per ton of cured hay. Whether a farmer will install a hot air system for curing hay or an ordinary forced air system without heating will hinge on three factors: 1) How much money he has available for the equipment; 2) The quality hay he needs; 3) The amount of hay he must store each year. Heat cured hay is left to cure in the field a shorter time and con-

PLAY SAFE! TEST THE MOISTURE CONTENT OF ALL CROPS WITH American ALL-CROP MOISTURE TESTER

ONLY $68.00

COULD SAVE YOU THOUSANDS

A truly accurate and quick method of knowing moisture content in your crops. Enables you to control harvesting scientifically. Used by leading farmers everywhere.

For hay, grain, seeds. All electric simple operation.

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FARM AND HOME "HANDY PUMP"

An all 'round ¾" pump for farm and home utility use. Weighs only 20 pounds—self-priming. Fits pipe or garden hose. 8 GPM at 40 lbs. pressure (more at lower pressures). Lifts up to 25 ft. Electric. Complete. Guaranteed.

HANDY

Gorman-Rupp Pumps are made in all sizes from the Handy and Midget up to irrigation pumps delivering 1000 GPM at 100 lbs. pressure.

The MIDGET 1½" pump—weight 62 pounds. Pumps 5500 GPH . . . Self-primes to 30 feet . . . non-clogging . . . trouble-free.

MIDGET

Send your name on a postcard for complete literature.

GORMAN & RUPP Pumps

THE GORMAN-RUPP CO.
MANSFIELD, OHIO

Saves the day that *makes* the hay!

New MEYER Hay Conditioner

Hay one swath from mower is processed and "fluffed" to speed natural aeration and curing. Retains leaves, protein and carotene (Vitamin A). Hay remains soft and pliable. Beats weather hazards — Put up hay the same day — Gains 24 hours over pre-Meyer method. Saves time . . . labor . . . and food value — makes your hay worth more.

Write for FREE Folder and Prices today!

THE MEYER MFG. CO.
BOX 952 MORTON, ILL.
Makers of Famous Meyer Elevators

HOW TO KEEP WARMER—*with a blanket of AIR!*

Yes, air. It's hermetically sealed between two panes of glass in the modern windowpane—*Thermopane*® insulating glass. What a difference it makes!

With *Thermopane* you don't have to move away from your windows in cold weather to avoid drafts. It's like adding a couple of feet to your rooms.

Thermopane cuts in half the heat you lose through single-paned windows. That saves fuel—plenty. Cuts down frost and steam on windows, too.

And what a boon to the man of the house . . . this self-insulating window stays in all year. No storm sash to put up or take down. Or wash or paint. *Thermopane* is installed when your house is built—and your window insulating job is done once-and-for-all.

You can use *Thermopane* in every window in the house—picture, double-hung, casement, sliding, awning—any type of window. Your L·O·F Glass distributor or dealer, or your building supply dealer, can tell you all about it. Or write for *Thermopane* booklet. Libbey·Owens·Ford Glass Company, 2131 Nicholas Building, Toledo 3, Ohio.

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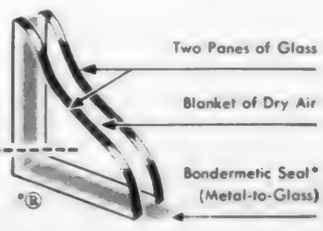
L·O·F GLASS *Thermopane* LOOK FOR THE NAME ON THE SEAL BETWEEN THE PANES

FOR BETTER VISION SPECIFY THERMOPANE MADE WITH POLISHED PLATE GLASS



Dairymen profit in Florida from huge demand for dairy products caused by rapid population gains. Tourists are here by hundreds of thousands in summer and winter. Permanent population is growing by leaps and bounds. Florida is one of fastest growing states.

Matchless climate — which lures new multitudes of consumers to Florida — works additional ways for the dairyman. Good pasture-land is available. Much of it near growing cities' retail routes, or where large distributors purchase raw milk.

Improved pastures carry herds eight or ten months, cut down cost of winter feeding. Producers enjoy a steady demand for fluid milk. And there is a big market for sweet cream for ice cream manufacture.

Come to Florida this winter. You may find your future in the land of sunshine.

Fun for farm families

Families benefit in Florida's climate, too. Opportunities for recreation are close at hand. Florida weather encourages their year around enjoyment. There are thousands of lakes, rivers, hunting and picnic areas. Healthy, happy families are the result.

Where Matchless Climate Profits Farmers

Florida

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City_____ State_____

sequently there is less loss of protein and vitamin "A." The added quality of heat cured hay over that cured with unheated forced air is convincing farmers and research men alike that heat, man-made and controlled, is the better system when the farmer can afford it.

In planning a mow-drier it should be kept in mind that they are not stock items, but must be tailor-made to your own barn measurements and mow conditions to assure the best results.

There are on the market a few structures designed specifically for hay curing and storage. One of these is a steel silo-like structure with a vertical tunnel through the center. Chopped hay is blown to the top of the hay maker, where it is automatically distributed around the air duct in the structure. Hay is cut, allowed to wilt for as little as five hours, then blown into the hay maker for curing. One refinement of this structure has cattle feeding areas built in the bottom of the round hay mow, eliminating the heavy work of handling the hay from mow to cow and turning the structure into a giant self feeder.

Ed Frechling, who raises pure bred Herefords in Butler County, Ohio, purchased one of these structures from the Martin Steel Corporation last summer. The mixed legume and grass hay cured in it retained its green color, and was cured at an estimated cost of a dollar a ton. Many farmers agree with the engineers who think this method of making hay has a future because of the good quality hay it makes, the labor it could save in feeding, and the storage capacity it offers.

The farmer with his new mow dryer must still use care in handling his hay crop. His hay should be hauled to the mow before the leaves begin to shatter, but not until its moisture content is down to 40 per cent for loose hay, or from 30 to 35 per cent moisture for chopped or baled hay. Hay will generally come down to this moisture content in one good drying day—much faster if a hay crusher is used.

GREENBLADE

Asgrow lawn seed mixture without ryegrass

FOR LAWNS THAT LOOK WELL, GROW WELL, WEAR WELL

Greenblade gives you a better lawn because of its higher proportion of the desirable permanent grasses that combine to make thick, smooth, wear-resisting turf.

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Write for free information explaining how to make up to $3,000 in your own backyard. *Address:*

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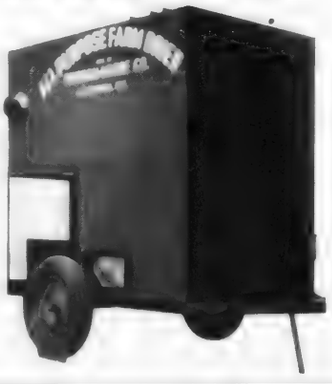
Dept. 145 Columbus, Kansas

HAY



Is what *YOU* make it *TODAY*

Eliminates Weather Risks From Crops

Hay cuttings which might be total losses due to wet weather can now be harvested with just one day of good weather, with food values and quality 2 to 4 times that of ordinary hay.

Listed and labeled by
UNDERWRITERS' LABORATORIES.

Write for FREE color booklet.

PEIRSON-MOORE CO.

740 National Avenue Lexington, Kentucky

Test Your Soil NOW!

Make Every Acre Pay You Double

Many SUDBURY users tell us they have ***more than doubled*** their yield—gotten better quality, too. An Ohio man boosted his corn 300%, oats 500%, wheat 100% and hay 300%! Reports from all over the country, with every kind of crop, ***prove*** that soil testing will increase your crops up to three and four times. This can mean hundreds, even thousands of dollars to you.

Guessing is Costing You Money

When you don't test your soil you're ***guessing*** what it needs. But with soil testing you know—you know exactly what fertilizer formula to put on every field. An Illinois farmer saved $500 by using 125 tons of limestone instead of the 360 he ***guessed*** his soil needed. This paid for all the phosphate which tests showed was badly needed on 65 acres. Up went his yield!

EVERY FIELD IS DIFFERENT

Soil needs vary from field to field. Only soil testing can tell you where more nitrogen is needed—or phosphate, or potash. Or whether lime is needed and how much. Using too much lime will throw the soil out of balance so plants cannot absorb the phosphorus they must have to produce good crops. There's no one fertilizer formula that can meet the needs of every field. If you've already bought this year's supply, you can still make it right because the SUDBURY Tests tell you what to add.

Get Back $3.00 from Every Fertilizer Dollar!

Your SUDBURY Kit enables you to get up to $3.00 and more back from every dollar spent on fertilizer. Trials on seven fields in Illinois proved that every $14.42 spent on phosphate and potash brought $43.00 in extra crop yield. In Maine, testing and fertilizing pastures brought $370.00 additional milk receipts per year from one herd, at a cost of only $74 for fertilizer—$296.00 extra profit just by following soil tests! Your livestock will be much healthier, more profitable, grazing on pastures and forage grown on soil tested the Sudbury Way. An Ohio farmer boosted his corn and hay 300%, oats 500% and wheat 100% with his Sudbury Soil Test Kit!

It Pays To Test Your Own Soil

There are big advantages in testing your soil the easy SUDBURY Way. You get the tests exactly when you need them, not days or weeks later. No wrapping or mailing; no waiting for reports. Your SUDBURY Kit is always handy, so you make ***more*** tests than you would ever get otherwise—you'll use the right fertilizer on every crop you plant all year round.

No Knowledge of Chemistry Needed

It's so simple to test your soil the SUDBURY Way that you can get accurate results with your very first test. Even a teen-age boy can do it. And it's as easy as reading a thermometer. Fast, too—takes less than ten minutes. Costs less than 10c each.

As this picture shows, even after liming and using phosphate where soil tests showed they were needed, also adding nitrogen and potash raised corn yields greatly. Balanced fertilizer, guided by Soil Tests, can produce 100 bushels per acre, even up to 150! (Photo courtesy Wisconsin Agricultural Experiment Station.)

Everything You Need for HUNDREDS of Tests

This SUPER DE LUXE MODEL comes in a welded steel chest with carrying handle so it can be used anywhere—even right out in the field. It is the same kit we supply county agents, government departments, agricultural colleges, as well as progressive farmers everywhere. Built to last a lifetime. Makes hundreds of tests for nitrogen, phosphate, potash and lime (pH or acidity). Includes charts showing needs of 225 different farm crops, fruits, trees, flowers, etc. Easy-to-follow instructions. Complete in every respect—nothing more to buy. Money-Back Guarantee. Formerly $27.50—increased demand has made possible new low price of **only $24.95.**

FREE TRIAL—If after 10 days you are not delighted with your SUDBURY Soil Test Kit, return it and get your money back.

BETTER CROP GUARANTEE—If at the end of the season you do not feel that your kit has more than paid for itself, return it for full refund.

SUDBURY LABORATORY
Box 523, South Sudbury, Mass.

YOU, TOO, CAN BOOST YOUR YIELDS

Whatever crop you plan to raise, you can make them show just as marked improvement if you test your soil ***now*** and add what is needed. The cost is small, the rewards are great. The soil is the backbone of your farm—more important than all your buildings, implements and stock. Far too important to guess about its needs!

Send the coupon for your SUDBURY Kit today—you'll want to use it right away. And when you see what it does, you'll use it every season from now on!

Start NOW by Mailing Today

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Send me the Sudbury Soil Test Kits marked below:

..... Super DeLuxe Models, @ $24.95

☐ Enclosed is $..... Send order prepaid

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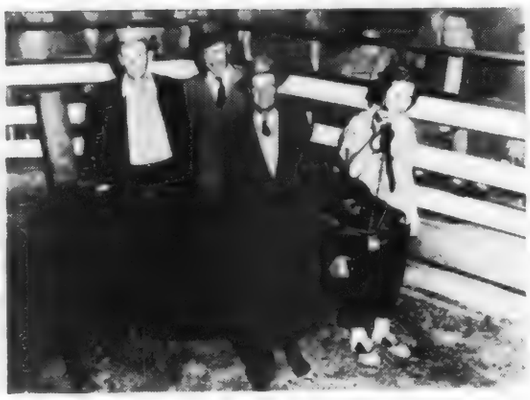
Over 250,000 Now In Use

World's Largest Makers of Soil Testing Equipment

DEALERS!
Serve Your Customers by Carrying this Essential Aid to Better Farming. *Write for Special Offer.*

MINRALTONE

HELPS BUILD CHAMPIONS



Envious 9th of Fra-Mar, 1950 Georgia Champion, is junior herd sire at Frank Binford's Fra-Mar Farm at Thomaston, Ga. Mr. Binford (second from left) is an enthusiastic feeder of MinRaltone.

Fra-Mar Farm Stock Protected Against

*HIDDEN HUNGER**

Mr. Binford says, "*For beef cattle production, we need a mineral supplement that's palatable when fed free choice, and one that helps keep up a high percentage calf crop. MinRaltone fills both requirements.*"

What MinRaltone will do for one breed, it will do for *all*. Follow the lead of successful stockmen—feed MinRaltone regularly, year 'round. MinRaltone protects against *Hidden Hunger because it contains 11 essential mineral elements with Vitamin D. Write for free MinRaltone feeding booklet and complete details.

NEAR'S FOOD CO., INC. • BINGHAMTON, N. Y.
EST. 1899
Plants in Binghamton, N.Y. — Forsyth, Ga.

***HIDDEN HUNGER** — Lack of essential mineral elements needed by livestock for sturdy health, rapid growth, peak production and reproduction.

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MINRALTONE
HEALTH - PRODUCTION - PROFITS

BROWNELL ROSES 25 EVERBLOOMING SUB-ZERO HYBRID TEAS
25 HARDY CLIMBERS—For long life in your garden
More Flowers; More Constant, Large and Beautiful as Any
MULTIFLORA for FENCES Pictured List Free LITTLE COMPTON, R. I.

As the hay is put into the mow it should be distributed evenly over the system, which means that it will be mounded slightly over the main air duct. The first layer should be placed over the air duct and extend only a short distance onto the slatted floor. Each new layer should be blanketed so that it gradually comes out to the edge of the mow. It should be leveled off when the fresh hay is six or eight feet deep.

As the hay is put into the mow the farmer should tamp it as little as possible and chopped hay should not be walked on at all. The total depth of damp hay on a drier should seldom exceed eight feet for long hay or four feet for chopped hay. At the end of the haying season the hay can have a total depth of as much as 20 feet and the last layer can still be dried by the forced air. With present knowledge hay can be cured to any reasonable depth, but it should not exceed the depth for which the system is designed.

As soon as the hay is in place the fan should be switched on and the system run continuously for the first week. For the second week it should be turned on during the day time. The top will be the last to dry and the farmer can tell when the curing is complete by feeling the top one foot of hay in several places. But a test should be made to detect possible hot spots. After the fan has been shut off for several hours, start it again and walk slowly around over the newly cured hay. If a blast of warm air hits you, you are standing on a hot spot, and the fan should be left on for another day or two, when you can check once again.

Many farmers have geared their haying operations to the field baler, because they prefer bales since they can be stored more advantageously. The fortunate few who are able to make more good hay than they need for themselves, or who sell their crop and buy better hay for their own cattle, find baled hay easier to sell. Good news to baled hay addicts is the fact that they can take just as much comfort from a mow-drying system as their long hayed neighbors.

Drying bales is little different from drying loose or chopped hay. It will work with either the Tennessee or Ohio systems, though the slatted floor or "A" duct drier affords easier stacking. And if neither system is available, you can make an air duct out of bales. This method can be used by farmers who have portable driers which they can set up alongside the barn.

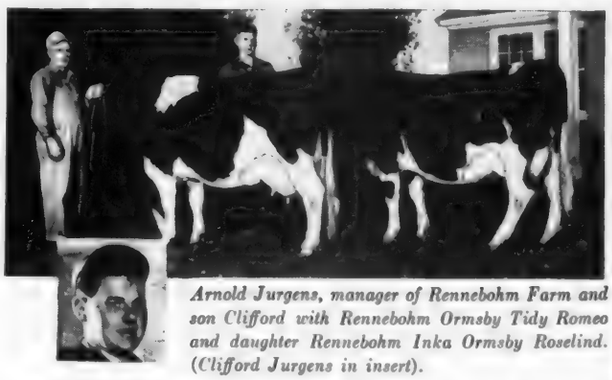
Best results with baled hay are obtained when the moisture content is about 35 per cent. The leaves will be dry enough to rattle and will crumble slightly when rubbed between the hands, yet they will not shatter or fall off the stems. A baler won't work well if the hay is much heavier than this.

When baling for the mow-drier, experts advise setting the press just tight enough to make a firm bale that handles well without coming apart. The bales should be stacked as closely together as possible, to leave no space through which air can escape. Rectangular bales, they say, should be stacked on edge, because it is easier for the air to penetrate the sides than the top or bottom. Each succeeding layer of bales should be offset one way or the other from those below, to close the cracks between the bales.

Early in 1950, the owner and farm manager at Osborndale Farms in Upper New York, looked over the confusing array of new haymaking methods and decided to cure hay on the wagon so they purchased a field chopper and a field crop drier.

Their hay is cut one day and run through a field chopper the next day at about 50 per cent moisture. They have three wiresided wagons and a forage blower to get the finished hay into the mow. Running up the center of the 14 foot wagons is a heavy gauge

PROMINENT DAIRYMEN SAY PENSTIX® BEST WAY TO CONTROL MASTITIS FAST



Arnold Jurgens, manager of Rennebohm Farm and son Clifford with Rennebohm Ormsby Tidy Romeo and daughter Rennebohm Inka Ormsby Roselind. (Clifford Jurgens in insert).

Frank Elderbrook, with one of his herd of fine Holsteins.

NEVER EXPECTED TO SAVE THIS COW: PENSTIX TURNED THE TRICK

BURLINGTON, WIS.—Frank Elderbrook, along with his brother and father, operate two dairy farms here, totaling nearly 270 acres. They milk an average of 55 Holsteins. Mr. Elderbrook has tried many methods of treatment for mastitis through the years he has been in the business, and says he has never found anything to equal Penstix for its uniformly fine results.

"Last March," he says, "we had a cow infected with mastitis that we never expected to save. Then we started using Penstix. Her udder was terribly inflamed and it certainly looked like a hopeless case. We kept right on using Penstix every day, until she was dried up. Three months ago this cow freshened, and has been milking well in all four quarters. Her bag is in good condition without a sign of mastitis."

Mr. Elderbrook likes to use Penstix and keeps a supply on hand all the time. Here's how he feels about Wyeth Penstix. "They are the most convenient, sanitary method I know for mastitis control. We like the way they are wrapped, and the fact that Penstix does not require refrigeration. You can put me down for Penstix every time."

NO 'LOST QUARTERS' ON RENNEBOHM FARM WITH PENSTIX

MADISON, WIS.—"We haven't been losing quarters since using Penstix," Clifford Jurgens, herdsman on the Rennebohm Farm here stated at a recent interview. He and his father, Arnold, manager of the farm, have been using Penstix for the treatment of mastitis since these penicillin bougies first appeared on the market two years ago.

Farming 285 acres with 107 registered Holsteins, Clifford Jurgens finds Penstix easy to use, easy to keep on hand. He says, "At the first sign of mastitis we insert two Penstix into the infected quarter and then follow this up with one insertion every twelve hours. Often the infection clears up completely in less than two days. Never takes more than three in the more serious cases."

Commenting on Penstix-SM bougies, the new combined antibiotic treatment, combining penicillin and dihydrostreptomycin in a single bougie, Mr. Jurgens said, "We are mighty glad to have Penstix-SM available, with streptomycin added, especially for treatment of severe infections. But for most cases of mastitis, I don't see how you can beat Penstix."

FAMED PABST FARMS ALWAYS USE PENSTIX: SAY RESULTS EXCELLENT!

OCONOMOWOC, WIS.—Pabst Farms, located near this Wisconsin town, maintain 420 registered Holsteins on three farm sites. In 1950 the Pabst Farm herds were the winners of 38 blue ribbons at five state and national farm shows. They were named 'premier exhibitor and breeder' at the Milwaukee-Wisconsin State Fair, the Indianapolis-International Dairy Show and the Iowa National Dairy Congress.

Sylvester Weiler, head herdsman for the Pabst Farms is an enthusiastic booster for Wyeth Penstix in mastitis control. He says, "Penstix play an important part in our herd management program. Because of accidental injuries to the udder, it is impossible to eliminate mastitis a hundred per cent. That's why we always keep several packages of Penstix handy, in every one of our barns."

Sylvester Weiler, head herdsman at Pabst Farms near Oconomowoc, Wis.

Mr. Weiler goes on to state, "All of our men are instructed to use Penstix at the very first sign of trouble. Insertion is easy, and the results throughout the herd have been uniformly fine."

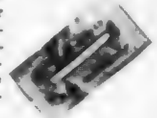
The Pabst Farms have been breeding and developing outstanding Holstein-Friesians on their farms since 1908, and have consistently been the winners of blue ribbons and awards for their cows since that time.

WYETH PENSTIX OR OINTMENT MAKE MASTITIS CONTROL EASY

Now you can get the treatment to fit the infection, when mastitis visits your herd. Dairymen everywhere are talking about the effective, economical, easy to use Wyeth line of products for control of this disease, one of the most costly to the dairy industry.

Penstix penicillin bougies each contain 25,000 units of crystalline penicillin G, effective in treatment of mastitis caused by streptococcus agalactiae. The Penstix-SM bougies contain the same amount of penicillin with the addition of 25,000 units of streptomycin. This latter combined antibiotic treatment is most effective in more severe forms of mastitis infection.

For cows with dry quarters, where the use of bougies is impractical Wyeth Penicillin Ointment is usually indicated or the Penicillin-Dihydrostreptomycin Ointment, in the new easy-to-insert tubes.



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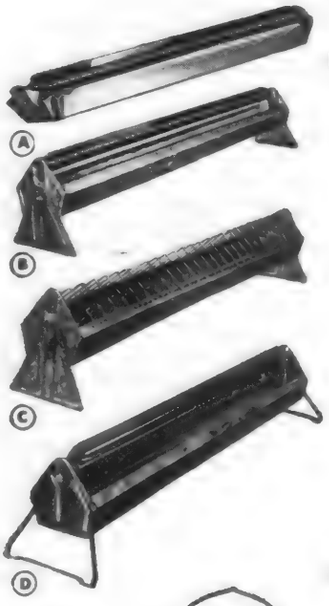


Famous HUDSON Kleen-Ezy* Feeders

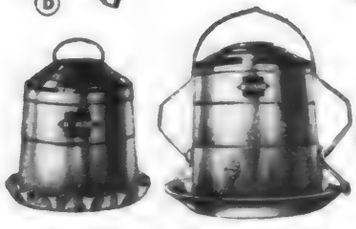
Sloping sides keep feed sliding to bottom without packing in corners. Permit chicks to get up close to feeder. Feed-saving lip reduces "billing out." Non-roost reels or grill.

A. HUDSON CHICK FEEDERS
One-piece heavy lacquered steel. No seam. 3 sizes: 18-in., 24-in., and 36-in.

B. HUDSON CHICK and GROWING FEEDER
End stands quickly adjustable. 2 sizes: 36-in., and 48-in.

C. HUDSON BROILER FEEDER
Wing nuts permit easy height adjustment for chicks 2-weeks old up to broiler weight. Choice of hinged grill (shown) or reel.

D. FEEDER WITH FOLD BACK STANDS
End stands quickly adjust height for small or large birds. 48-in. with reel; 60-in. with grill.



Sanitary Ezy-Fill* Chick Fountains

Individual cups shaped into bottom pan prevent chicks from getting into and fouling water. Cupped pan fills twice as often as ordinary pan; keeps water fresher. One gal. and two gal. sizes.

Ezy-Fill Growing and Flock Fountain

To fill, just remove pan, reverse handle and use as pail! Easy to clean, handy to fill and carry. Special saucer shape pan. Makes drinking easier; prevents wading. 3 and 5 gals.

HUDSON Double-Wall Fountains

Patented air-groove lets air enter fountain without gushing. Self closing valve. 3 and 5 gal. sizes.

HUDSON Automatic Trough Waterer and Automatic Valve

At last—a foolproof, fully automatic valve! When trough is full, weight of trough and water pulls valve shut. As water is drunk, valve automatically opens to let water flow. Valve shuts automatically when trough is removed. Holds four quarts—use one for 500 chicks.

Automatic valve with chain also sold separately.

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wire tunnel about 4 feet high by 3 feet wide. The 6 foot rack is airtight for the first two feet and made of chicken wire the rest of the way. There is an opening to the wind tunnel at the back of the wagon fitted with a collar to take the short canvas tube connecting it to the furnace.

The unit is set up in the barnyard. A wagon load of hay is backed up to it, and a forced draft of 180 degree air is blown into the tunnel for about 40 minutes to complete the drying. In the meantime a second wagon is loaded and waiting, and the third wagon is in the field.

They discovered by experience that finely chopped hay was slow in drying, for it packed too tightly and there was not sufficient pressure to force air through it fast enough. Thus began a process of removing knives from the field chopper, until only one was left, which cut the hay in eight-inch lengths.

Unfortunately they were too busy perfecting their system to keep any record of operating costs and production rates. They know that fuel and power consumption was low compared to other heat drying methods; that the system will dry hay fast enough to be really practical on their farm; and that it makes by far the best hay they have ever fed. Figures provided by the manufacturer indicate a cost of about $1.50 a ton for drying hay of 45 per cent moisture. The investment in the drier and wagons was about $2100.

And similar crop driers are being used to cure baled hay both on wagons and in outside stacks. At the Brays Island Plantation, Yemassee, South Carolina, bales are placed on an outdoor slatted floor platform two to three deep and covered with a canvas during the drying period. The canvas holds the air back and makes it penetrate through as well as around the bales, building up an even temperature throughout the stack, with a gradual loss of moisture. This system is said to provide uniform drying and makes excellent quality hay.

Two double-furnace units with 5 horsepower motors dry over 600 tons of hay a year here. The portable hot air driers can be used for either grain or hay. They generally operate with a fuel oil furnace. They are complete with fans, furnace and canvas air ducts.

Over ten years ago the Bean Manufacturing Co. of Lansing, Michigan, put a machine on the market which is claimed by farmers to be the best thing to hit the hay field since the side delivery rake. Bean's machine is a hay crusher, a stem-crushing attachment behind the cutter bar. Built like a king-size clothes wringer, it picks up the freshly cut swath and cracks the stems and nodes between its steel cylinders. The cracked stems lose their moisture in about half the normal time, so that in excellent drying weather it is possible to cut in the morning and bale in the afternoon of the same day. The stems of crushed hay dry about as fast as the leaves.

The mower-crusher has its disadvantages, too. It's $2,000 price has kept it out of reach of the majority of farmers. Now lighter weight hay crushers are being marketed at lower prices.

Farmers and manufacturers alike know that the last chapter in the curing of hay has not been written.

THE AUTHOR: Theodore Prescott feels that the best possible hay is none too good for the Holstein cows that browse so placidly over so many of the dairy farms of America. This is not surprising since he is Associate Editor of the **Holstein—Friesian World**, which is the oldest magazine devoted to purebred dairy cattle. Since 1938, when he was graduated from Cornell University, he has spent all of his time writing about the big black and white cow and her problems.

GARDEN TRACTORS

(Continued from page 51)

haul out feed to hogs and I've even rigged up a seeder to sow grass between corn rows in the fall. We tore down an old corn crib last fall and buzzed up all the boards with the garden tractor saw. I sprayed all my pigs with it."

When the prospective buyer views the field he is faced with a bewildering variety of types, which will probably confuse him as much as the little boy who lost his chewing gum in the hen house.

One of the most important things to keep in mind when buying a garden tractor is the service which comes with the machine. If you buy a widely distributed machine from a dealer in your neighborhood you are assured of quick service on repairs and parts. There are a number of orphan engines as well as orphan tractors now in use which will be almost worthless should a vital part need repair or replacement.

Specifications

(1) Horespower: It is unwise to send a boy to do a man's work, but just as unwise to buy more horsepower than is needed. For light operations, mowing the lawn, cultivation and weed control of the kitchen garden, the 1½ to 2 horsepower tractor is satisfactory. Light machines of this type can not be expected to do a good job of plowing. Plowing depth is limited to not more than ten inches for even the most powerful machines, and heavy soil complicates the job.

The heavier the machine the more versatile it is. Ruggedness and increased power permit an expansion of duties. The 4 and 5 horsepower tractors will do a satisfactory job of plowing at a 6 to 10 inch depth; they will haul heavier loads, cut a wider swath, and stand up better under heavy duty. For the vegetable garden of less than an acre, a small machine is all that is necessary provided the plowing is done by a field tractor. For the produce gardener who has several acres, or the farmer who wants a machine a cut below his field tractor, the more powerful garden tractors are recommended.

Another factor in buying horespower is the buyer's muscle. The operator must move weight when he makes a turn or backs out of a dead end unless his tractor has a power reverse; he must keep the tractor in line on the level and help it on slopes. A man with mighty muscles finds this no great chore, but a bantamweight should know his own strength.

Many garden tractor buyers make the mistake of buying a lower horsepower than they need, expecting a light machine to do more than it can because of its horsepower rating. A one horsepower tractor can not do the work one horse can do; a two horse tractor won't do as much as a team. The horsepower of an engine is rated by a complicated formula which involves drawbar pull, speed of tractor, and a period of time. A horse can put all his power into one strong pull. Except in a mathematical formula, the rating of an engine has little relationship with what a good horse can do when he feels like it.

Fuel consumption is a negligible factor in purchasing horsepower. The smaller machines will operate an eight hour day on two gallons of ordinary gasoline; the larger tractors will not use more than five gallons for the same period.

(2) One or Two Wheels: There are not more than a half dozen one-wheeled garden tractors but those who make them and those who buy them believe they have many advantages over the two-wheeled types.

Grow Stronger, Healthier
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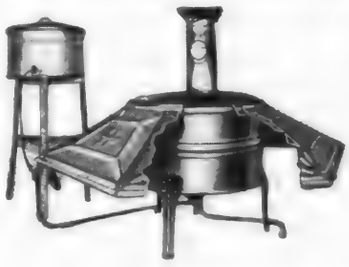
HUDSON MOTHER-HEN* OIL BROODER



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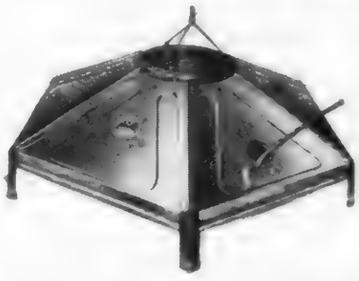
HUDSON-HART* GAS BROODER



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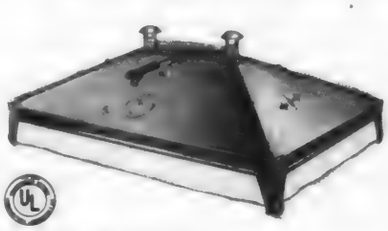
Clay cones above burner reflect radiant heat. Automatic thermostat control. Entire burner assembly attached to hover. Only one burner, one pilot light. Wire guard encloses burner and radiants. Adjustable ventilation openings. Pilot always on—serves as attraction light. Adjustable legs raise hover 3 in. Easily interchangeable jets provided for use with propane, butane, bottled, natural or manufactured gas.

HUDSON LEKTRIK-HEN* ELECTRIC BROODER



No refueling—no bother.

No work—no worry—completely automatic. Two powerful, fully enclosed heating elements. Balanced heat distribution with controlled ventilation eliminates moisture, keeps litter dry. Fully insulated. Adjustable legs allow extra head room as chicks grow. Economical operation (usually less than 1c per chick). Sizes for 500, 300, 100 chicks.

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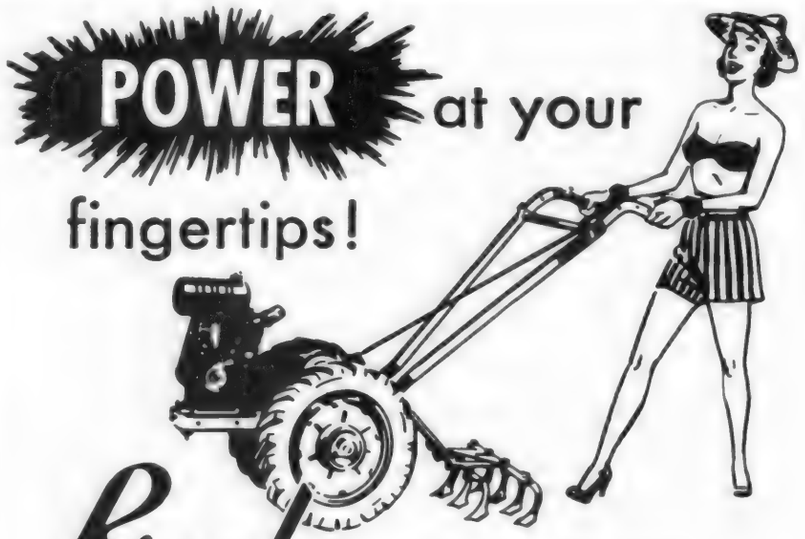

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Being light, they are more maneuverable; they can work in closer planted rows and have a slight advantage on slopes and hillsides. Having less parts the cost is reduced and no differential is required. They can be used to cultivate higher growing plants which a two-wheeler could not clear.

The two-wheeled jobs have more traction and therefore exert more drawbar pull. They can straddle a row, cultivating on both sides. They are balanced easier. Clearance of the machine for straddle-row cultivation varies and is a factor to be remembered when making a purchase. Some of the two-wheelers have clutches which result in a sort of free wheeling on slopes and hillsides, making it necessary for the operator to hold them back. The engine acts as a brake on the one-wheelers. Some makes have adjustable axles to regulate the wheel spread.

(3) Types of drive: There are three types of drives, belt, chain, and gears. Most makes use a combination of the belt and chain—the belt from the engine to a jack shaft and a roller chain or gearing from there to the wheels. Some have a direct drive. All three have their advantages. A belt wears out, a chain loosens and gets fouled; gears are expensive, but durable. A belt is the easiest serviced and when used as a substitute for a clutch it lowers cost. The final drive should in all cases be enclosed. This permits more

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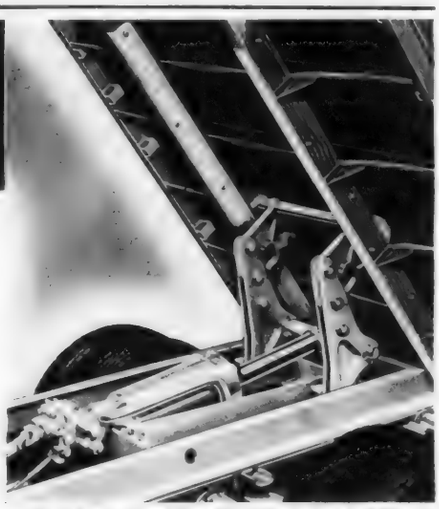

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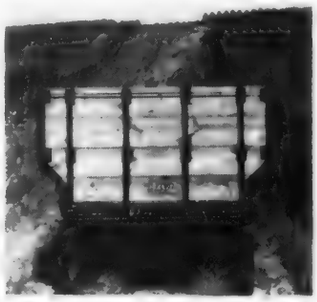
"Here's that famous FARMHAND TEAM— 3 great 'worksavers' for modern farming!"

SEE HOW EASILY you can save money and manpower on all the big lifting, loading or moving jobs on your farm.

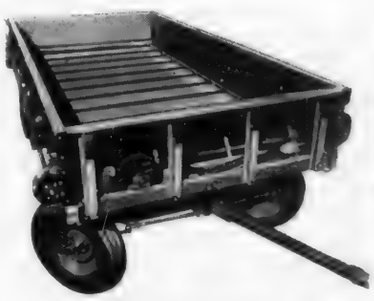
FARMHAND 3-LEVEL FORAGE UNIT



SAVE TIME—LABOR COSTS. Farmhand's new self-unloading Forage Unit handles grain, silage, chopped hay—from field to finish. Full roller chain conveyor.

6-TON CAPACITY—Even on turns, high, flared sides catch discharge from harvester spout. 6 x 14 foot marine plywood bottom mounts on any standard wagon.

WHILE YOU WATCH—Takeoff-powered worm gear drive unloads 6 tons in 6 minutes. Clutch lever gives you instant control. Available for use with speed jack.

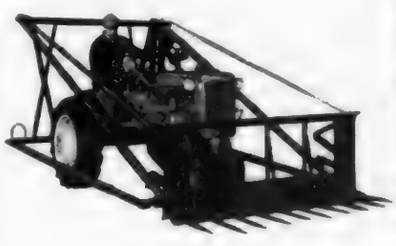


FARMHAND "POWER-BOX"

SPREADS FASTER! "Power-Box" plus Spreader Attachment does more than 4 ordinary spreaders. Mounts on truck, gets manure to the back of your farm.

FEEDS STOCK—up to 6 tons in 2 minutes with Mixer-Feeder Attachment. Feeding is a one-man job! Mounts front or rear. Gives you more beef at less cost!

UNLOADS ITSELF—no shoveling! Big, 6-ton all-purpose box has endless chain conveyor, worm gear drive for smooth operation. Takeoff-powered. Instant clutch control.



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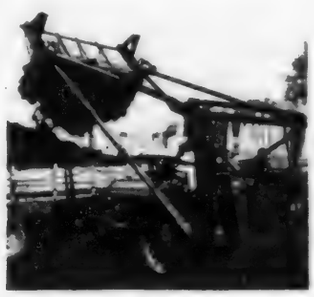
LIFT 2000-LB. LOADS. Low-frame "Special" Loader has smooth hydraulic power, "Wrist-Action." Do big jobs with smaller tractors.

BUILD HIGHER STACKS. Take half-ton loads, pile 'em 21 ft. high—with Hay Basket and Push-Off. Self-leveling action balances load.



LOADS MANURE, scoops, carries, makes dozens of tough jobs easy. Complete line of attachments save you time, work all year around!

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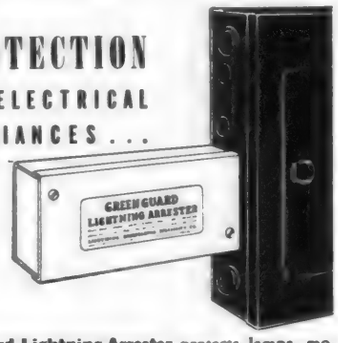
MODERN LIGHTNING PROTECTION

FOR FARMS AND COUNTRY HOMES

Lightning still starts three-eighths of all farm fire losses—more than twice as many as any other cause. Water piping and electric conduit, steel tracks and air ducts, all add extra hazard in modern buildings.

Security System does more than divert lightning strokes—it is engineered to *prevent* lightning from striking. Among thousands of buildings fully protected by Security, not one has ever been destroyed by lightning. With modern low aerial points, Security System is hardly visible. With Green Guard, shown below, it protects *both* building and electric equipment.

PROTECTION FOR ELECTRICAL APPLIANCES . . .



Green Guard Lightning Arrester protects lamps, motors, ranges, hot water heaters from surges induced by lightning. Prevents flashes induced in outlets, switches. No moving parts—nothing to wear or burn. Guaranteed five years; should last a lifetime. Get the full story now on both Security System and Green Guard. Address Security Mfg. & Contracting Co., Burlington 5, Wis.

SECURITY

Lightning Protection in the Modern Manner

efficient lubrication and prevents fouling by plants. Power for attachments, such as mowers and saws, is usually taken from a power-take-off by belt.

(4) Attachments: A buyer may assume that any garden tractor he buys today will do a satisfactory job. This is not true of attachments; experienced hands in the business say the attachments make the tractor. Not only the variety and function of attachments are important, but the design and the ease of changing. If it takes a half day to take off the lawn mower and mount a cultivator, the purpose of a garden tractor is partly defeated. Buyers should note the type of mounting, count the bolts or clamps necessary to remove and replace, and the ease of changing.

Roto-Hoe.
A small, reasonably priced rotary tiller 2 hp, with attachments.

A bolt so placed that it will allow only an eighth of a turn with a wrench can be frustrating. Try this out before you buy.

There are five major groups of attachments: cultivators, lawn mowers, sickle bars, breaking plows, and bulldozers or snow plows. A host of others, including buzz saws, leaf sweepers, water pumps, sprays (for paint, insecticides and weeds) air compressors, carts, riding tandems, and the power take-off add to the value of the machine as a necessary implement around any farm, big or little.

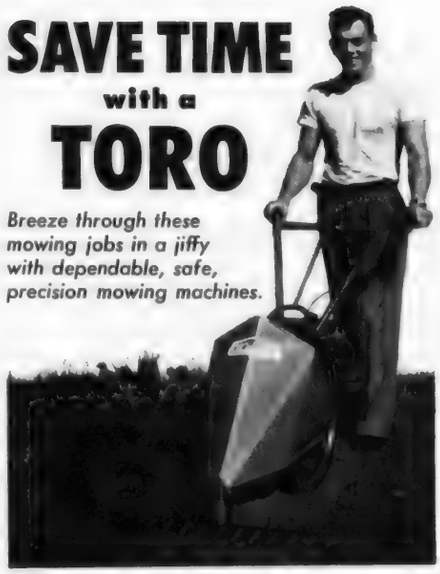
In selecting attachments the simple plan of analyzing your own particular needs is the best guide to a choice. Cultivators come in shovels, discs, spring and spike tooth harrows, teeth, and various types of sweeps. There are two types of lawn mowers, the reel type and the rotary type. Both do a very excellent job and these attachments are responsible for many happy garden tractor owners. The reel type ranges from 16 to 30 inches.

Finest of all low cost tractors. Plows, discs, harrows mows, saws, plants, hauls, etc. Has draw-bar pull for many jobs. Powerful, economical and super durable. Smartly engineered. Makes play out of hard irksome jobs. Excellent working visibility. Honor built. Designed for farmers, truck gardeners, private homes, estates, etc. Adjustable wheel widths. 16-inch row clearance. Has 3-speed Warner transmission, Rockford Clutch, 2 individual brakes, large roomy spring supported seat, Plow lift, auto type steering. Sold only direct to user at unusually low price. Prompt shipment. FREE details. In our 40th year.

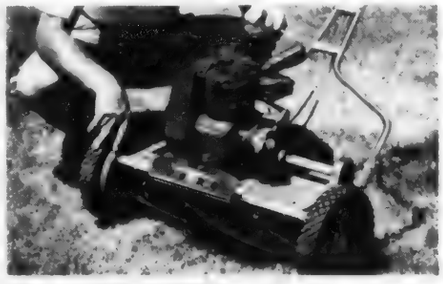
OTTAWA MFG. CO., 1-189 Garden St., Ottawa, Kan.

SAVE TIME with a TORO

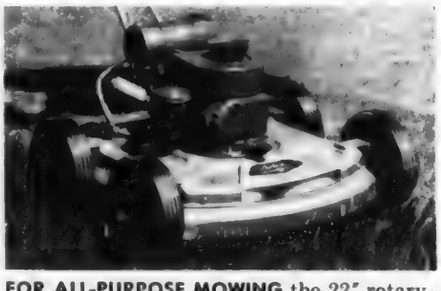
Breeze through these mowing jobs in a jiffy with dependable, safe, precision mowing machines.



FOR WEEDS, TALL GRASS and rank growth . . . get a Toro Zipper sickle-bar mower. S-h-e-a-r-s through weeds faster than 5 men with hand scythes . . . clips under fences, right up to buildings. Fine for ditches, orchards, headland. Self-propelled by powerful 1½ h.p. engine. Cuts full 36-inch swath.



FOR LARGER LAWNS your best buy is this 21" Sportlawn. Does all the work in a hurry—climbs steep slopes, purrs through thick grass with its husky 1½ h.p. quick-starting 4-cycle engine. Extra-wide diamond-tread tires. Ball-bearing mounted reel.



FOR ALL-PURPOSE MOWING the 22" rotary-blade Whirlwind is tops. Slices through thick, heavy weeds . . . grooms lawns slick as a whistle! Suction-Lift action pulls every blade up straight, cuts it off clean—even mulchifies the clippings so you don't have to rake.

MAIL POSTCARD TODAY for free literature describing new 1951 Toro power mowers designed for home use . . . or see your nearby Toro dealer for a demonstration. Write to: Toro Manufacturing Corporation, 3075 Snelling Avenue, Minneapolis 6, Minn.

NEW WAY TO USE WYETH VACCINE IMPROVES "NEWCASTLE" CONTROL

Photo above shows new easy Wyeth Plan "down-the-leg" method of vaccinating baby chicks against Newcastle Disease with "Killed Virus" Vaccine. Poultrymen may obtain free booklet describing this method in detail by writing to Wyeth.

WYETH 'DOWN-THE-LEG' METHOD INSURES BEST RESULTS, USERS STATE

RHODESDALE, MD.— One man who has perhaps done more vaccination of poultry against Newcastle Disease than anyone else on the famed Del-Mar-Va Peninsula, is J. W. Hockersmith. He has personally vaccinated close to two million birds since last February, using Wyeth "Killed Virus" Newcastle Vaccine.

Mr. Hockersmith has 'tried them all' and now uses Wyeth Newcastle Vaccine exclusively in his vaccinating work. "The kind of vaccine is mighty important," he says, "but the method and care of administration plays a big part in the effectiveness of the vaccine, too."

For some time now, Wyeth, as the result of experience obtained in vaccinating millions of broiler chicks, has been recommending 'down-the-leg' vaccination. The dosage is injected intramuscularly in the thigh of the bird with the needle pointing down into the leg muscle, away from the body of the chick. This eliminates any danger of internal injury to the bird from the needle.

Mr. Hockersmith supervises several vaccinating crews in this broiler producing area and says, "The new Wyeth 'down-the-leg' method of vaccinating with "Killed Virus" Newcastle Vaccine is working wonders. Broiler men here are very enthusiastic about the results they have obtained, along with the fact, that there are few, if any, vaccination-crippled chicks."

J. W. Hockersmith with one of his prize winning S. C. White Leghorns.

WYETH PLAN MAKES MOST MONEY: HELPS WEIGHT GAINS

FEDERALSBURG, MD.— Howard L. Wright has used Wyeth Vaccine on three flocks of broilers, totalling over 60,000 birds, with excellent results. First time he used this vaccine on 20,000 broilers, vaccinating when birds were about ten days old, he marketed them at twelve weeks. The birds averaged 3.80 pounds.

"Best chickens I ever raised," Mr. Wright says, "and I made more profit on them than I ever have since starting in the business in 1941.

"Seems like it's hard to teach an old dog new tricks," he continues, "because I let someone talk me into using a live virus nasal vaccine right after that. This batch were sick all the time, and I lost close to two thousand birds out of the 20,000. They all gained weight poorly and were graded low when marketed.

"Next batch, you can bet I switched right back to Wyeth 'Killed Virus' Vaccine in a hurry, and I haven't had a bit of trouble since."

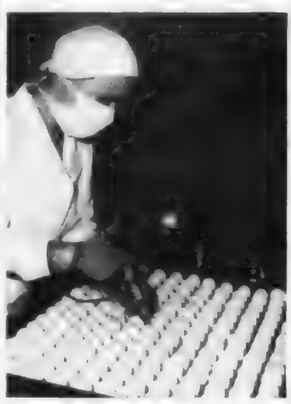
Banks of incubators at Morris Hatchery, world's largest.

WORLD'S LARGEST HATCHERY USING "KILLED VIRUS"

BISHOPVILLE, MD.— Here, at the world's largest broiler-chick hatchery, vaccinating teams are regularly turning out over 400,000 chicks a month, using Wyeth "Killed Virus" Newcastle Vaccine and the 'down-the-leg' method. These chicks are vaccinated on special order for broiler producers who specify "Killed Virus" Vaccine.

Results reported back to the Morris Hatchery have been uniformly excellent.

WYETH "KILLED VIRUS" VACCINE PACKS ADDED PUNCH



MARIETTA, PA.— Wyeth Newcastle Vaccine is unlike other commercial "Killed Virus" vaccines now available, because it uses a special type of Aluminum Hydroxide Gel as a carrier, according to technicians here. This carrying agent stimulates prolonged and increased immunization by delaying absorption . . . thus building powerful immunity in the birds over a much longer period of time than was previously possible.

Poultrymen should remember that Wyeth "Killed Virus" Vaccine does not affect egg production, egg quality, or weight gains.

The photograph at the left shows an operator at the Wyeth laboratories here injecting embryonic eggs with Newcastle Disease Virus, one step in the production of "Killed Virus" Vaccine.

CONSULT YOUR VETERINARIAN AS YOU WOULD YOUR PHYSICIAN

Wyeth Incorporated • Philadelphia, Pa.

Wyeth®

All-Season Service!

Speeds through more than 28 farm jobs . . . wide range of low-cost implements assures labor-saving utility 52 weeks a year.

Patented "Quick-Hitch!"

Permits fastest implement changes — less than one minute without tools.

Simple, Rugged Construction!

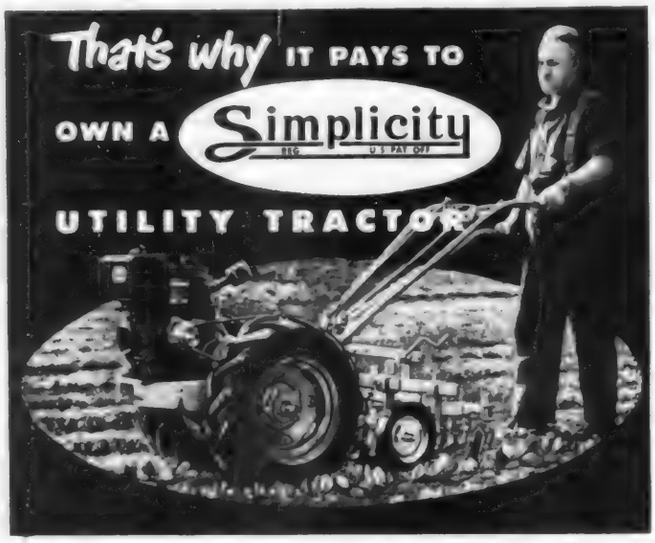
Compact package of strength — with one-piece steel frame, drop-forged alloy steel gears — for long years of service.

Easy Operation!

Simple controls readily respond to the finger-touch of any master — from "Junior" on up.

Easy to own!

No other utility tractor gives you so much performance at such low cost . . . initial economy plus savings over the years.



3 H.P. MODEL M-1 TRACTOR

5 forward speeds — with new "Lo-Lo" speed. Fully enclosed gears. Patented "Quick Hitch". True line of draft on rear hitch implements. Briggs & Stratton Model 9 Engine.

Implements Extra

2 H.P. MODEL L-1 TRACTOR

Twin to the M-1. Designed for lighter work. Briggs & Stratton Model "N" Engine.

Implements Extra

Simplicity Snow Plow —extra utility as light grader.

Simplicity Brush & Log Saw — cuts logs up to 16" diameter.

Simplicity Sickle Bar —clears 4 to 5 acres a day.

Thousands of owners, from coast to coast, hail Simplicity as the most useful power equipment a farmer can own. Simplicity has earned its position at the top of the field with maximum performance at lowest cost per equipment dollar. But ask your dealer for a demonstration . . . and let Simplicity prove its own value.

Simplicity 8-inch Plow

Simplicity Disc Harrow

Simplicity Spike Tooth Harrow

Write today for FREE illustrated literature and the name of your nearest dealer. Simplicity Manufacturing Company, 5103 Spring St., Port Washington, Wis.

Simplicity America's No. 1 Garden Tractor

Some are powered by ground drive, the same as a hand mower, some by a power take-off from the engine. The ground drive will operate only the smaller sizes. Some supply an adapter which permits the use of your old hand operated mower. Garden-All has an unique depth control of plow and cultivating attachments.

In making a choice of rotary mower, care should be taken that the engine has the power necessary to operate the knife at the high speeds necessary. The blade spindle should be rugged and made of the best material and the bearings should be sealed against dust and moisture. Most of the rotary machines will do a surprisingly good job on high weeds as well as grass. Adequate safety guards around the knives are important.

The sickle bar is one of the most popular attachments and recommends the garden tractor for large farms. Width varies from 24 to 48 inches. Most use a 2-inch knife section, and not the standard 3-inch farm knife sections. The sickle bar can be used on the lawn for a rough job; it clips as low as 2 inches. Vibration has always been a problem with the garden tractor sickle bar, due to the small mass of the machine. Various ingenious methods have been devised to overcome this. Chore-master uses a double action bar with two sections which compensate each other; Bolens uses a rubber shock absorber ball; others use variations of the cam shaft drive, and counter weights. Planet, Jr. has just come out with still another good method of eliminating vibration. Heavily inflated tires help absorb the vibration.

(5) Plows: The size of breaking plows varies from 4 to 10 inches. The use of the garden tractor as a breaking plow is a poor substitute for the standard field type of plow. It is possible to plow as much as an acre a day with the larger types (10 inches) but this requires a rugged operator who is willing to walk about ten miles. An eight-inch plow requires a twelve mile walk to plow an acre. The smaller sizes wander in and out of the ground and heavy soil injects a big problem. Sound advice is to break the ground with a standard plow and take the work on from there with a garden tractor.

All plows are the moldboard type except the Gravely, which makes a vertical rotary plow which does a good job.

(6) Snow Plows and Bulldozers: If the kids can't clear the walks after they come from school, the snow plow attachment is a gift from heaven. The garden tractor is ideally fitted for this task. The blades can be slanted on most makes or set for a straight ahead push. When there is no snow on the barnyard or walks, the attachment can be used to move gravel, clean out the chicken house or stable, or level a cultivated area. Gravely and Standard and some others now make a snow blower.

Larry Lafuse of Liberty, Indiana, who owns and operates a 360 acre farm, can speak with weight on the usefulness of a garden tractor on a large farm. "I need all the help I can get on farm work and the little jobs are always stealing my time. I find a garden tractor cuts down on time on the little jobs." Lafuse uses a garden tractor to spray his hogs and do an occasional paint job. He uses a cart to haul feed to hogs on pasture, a buzz saw to work up scrap lumber, and a leaf sweeper to clear his lawn and barnyard of leaves. He has both rotary and reel type lawnmowers, and uses a sickle bar three or four times a year on his fence rows.

(7) Clutches: The commonest type of clutch is the idler or belt tension type. Regulating the tension on the drive belt serves as a clutch. It is cheap and easily serviced, but it is hard on belts. Jaw clutches, which are usually completely enclosed, are operated from a lever on the handle. The David Bradley, sold by Sears, has a plate or friction type clutch. Some tractors have as an optional attachment a centrifugal or core type clutch. The principle of this clutch is similar to the fluid drive of automobiles. Without exceptions the clutches on modern garden tractors do a good job within their limits of cost. Buyers seem to prefer the low price of a belt tension type to something better at a higher price.

(8) Engines: Few manufacturers make their own engines as Cunningham, Standard, and Gravely do. Others prefer to use well known makes such as the Briggs & Stratton, Clinton, Lau-

The New Holland "77" twine-tie baler handles up to *10 tons of hay an hour!* Its floating pick-up gathers hay without damaging valuable leaves—highest feed value for your stock is assured.

"To get faster baling at lower cost you can't beat NEW HOLLAND!"

says R. WALTER HURLBURT, Berkshire Co., Mass. 1950 Winner—All New England Green Pastures Contest

WALTER HURLBURT, Holstein breeder, with Hurlwood Admiral Burke Lad No. 1112103—1st prize yearling bull at 1950 Eastern States Exposition. Modern farming methods have upped his grain-milk ratio 1 to 6 in winter, 1 to 8 in summer. He knows, too, the importance of good hay machinery—"I've used New Holland balers since 1942."

• For high capacity, there's nothing like New Holland's "77". No other baler gives you a *sustained output* of up to 10-tons-an-hour. No other baler is more ruggedly built. A survey of nearly 500 "77" owners showed that repairs for the 1950 haying season averaged only $21.40 per machine.

If you need a new baler for your 1951 haying, we *urge* you to see your New Holland dealer right away. And if you decide to buy a New Holland, be sure to place your order immediately. That's the only way you'll be *sure* of having your baler ready when haying starts this season.

Looking for a high-capacity, one-man WIRE-TIE baler?

New Holland's Model "80" wire-tie baler will package up to 10 tons of hay every hour. That's more than double the capacity of ordinary wire-tie balers. Special feature is the New Holland "inline twist" which lies flat—will not pull loose or uncoil.

Trouble-free baling with Certified Twine

The United States Testing Company has awarded its Seal of Approval to New Holland Twine for meeting its rigid standards of uniformity, quality and strength. Another farmers' favorite!

NEW HOLLAND *"First in Grassland Farming"*

NEW HOLLAND MACHINE COMPANY, NEW HOLLAND, PA.
A Subsidiary of the Sperry Corporation
Minneapolis • Des Moines • Kansas City • Brantford, Ontario

New Holland Side Delivery Rake operates from tractor's power take-off. Improved performance gives faster, cleaner raking.

New Holland High-Capacity Tractor Mower has 7-foot cutter bar—will cut the heaviest stand of any forage crop at speeds up to 7 m.p.h.!

New Holland Forage Harvester chops and harvests up to 15 tons of grass silage an hour—assures highest feed value for your stock.

Free Check catalog you wish and mail coupon to: New Holland Machine Co., 903 Ash Street, New Holland, Pa.

- ☐ Baler—Twine-Tie
- ☐ Baler—Wire-Tie
- ☐ Forage Harvester—Row Crop or Hay Unit
- ☐ Forage Blower
- ☐ Farm Wagon
- ☐ Baler Twine
- ☐ Baler Wire
- ☐ Bale Loader
- ☐ Side Delivery Rake
- ☐ Red Rubber Belting
- ☐ Hammer Mill
- ☐ Tractor-Mower
- ☐ Cylinder Corn Sheller
- ☐ Portable Tractor Saw
- ☐ General Purpose Mixer
- ☐ Husker-Sheller

Name_____

Street or RFD_____ Acres Farmed?_____

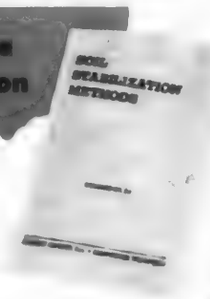
Town_____ County_____ State_____

use the SEAMAN
SELF-PROPELLED
ROTARY TILLER

One SEAMAN Self-Propelled Tiller—usually in only one trip over your fields—completely fits your soil for planting. Many tow a drill behind, till and seed simultaneously . . . And you'll greatly increase the crop capacity of your fields, for SEAMAN-tillage helps powerfully to promote humus development. The SEAMAN Rotary Tiller mills and inter-mixes all fertilizers and all vegetation uniformly through the entire tillage depth, builds up the richness of your soil. No "starved" or "hot" spots. Plant foods always within reach of seedling or plant roots.

Moreover, gear shift control gives you exactly the tilth — medium, fine or coarse — best suited for the soil in each field and the crop to be planted.

Invaluable in New Pasture Preparation or Pasture Renovation



Even rough, rocky, heavily brush-and-weed covered land can be quickly converted to an ideal seed-bed for grasses, clovers and legumes. And for old, matted, root bound pastures, the SEAMAN, adjusted for a cloddy tillage, kills out old vegetation, prevents erosion during the waiting period and — with another trip — prepares for a new seeding . . . No matter how large the acreage, how rocky or rough the job — there's a SEAMAN Tiller to make a better profit for you. And remember the Self-Propelled model frees a tractor for other work at the time you need it most.

FREE!
"Benefits of Rotary Tillage"

Probably the most comprehensive description of rotary tillage ever published. Yours, promptly, on request. And if you wish, ask us about rotary tillage on your farm giving us data on acreage, crops grown, pasture plans, types of soil, marsh, upland, rock, land clearing or other problems. We'll do our best in answering.

SEAMAN MOTORS, INC. 350 NORTH 25th STREET MILWAUKEE, WISCONSIN

son, Continenal and Wisconsin. With the exception of a two-cylinder engine made by Standard, all are single cylinder, four-cycle. All are started with a rope pull, although some have an optional accessory of a recoil starter, which is still a rope, but handier, for it winds itself around the starter.

The four cycle engine permits the use of ordinary gasoline and eliminates the old bother of mixing the lubricating oil with the gasoline, which is necessary for a two cycle engine. It is important to select an engine on which you can get local service. The engine requires more service than any other part of the tractor and parts and know-how should be quickly available. Many makers give the buyer a choice of engines.

(9) Costs: Pinning down the cost of a garden tractor is like trying to capture a flea on a dog's back. Most of them are sold like automobiles, f.o.b. the plant, and area determines the exact price. The industry is now in the midst of price changes, which further complicates price quotations. In general, the buyer can expect to pay $100 per horse power—$100 for a 1 hp tractor, $400 for a 4 hp. Any great deviation from this formula should be closely investigated. A higher price means either that the tractor has extra quality —or it is over priced.

The above prices are, of course, for the tractor alone. Attachments are extra, and a full line of major attachments, lawn mower, sickle bar, cultivators, plow, and snow shovel, usually will equal the cost of the tractor. For example, a 2½ hp tractor will cost about $250, the five attachments about the same or a trifle less. The lawn mower is usually the most expensive attachment, ranging from $35 to 135.

(10) Steel or rubber: The great bulk of the garden tractors sold today are mounted on rubber. A few manufacturers prefer steel and a few have optional steel or rubber. On some types of soil the steel wheel with lugs has more traction, but takes more power. The advantages seem to lie all with rubber—more power, can be operated on a lawn without damage to the turf, easier to operate, less vibration, the pressure in the tires can be altered to suit conditions. There is little if any difference in cost.

(11) Weights: Most makers supply a weight for increasing traction or as a counter balance. Attached on either the rear or front of the tractor, or as wheel weights, a weight increases the traction of the tire, permits deeper penetration of tools, and when used as a counter weight on such attachments as the sickle bar or plow, allows greater ease of operation.

(12) Speed: The speed of garden tractors ranges from 1 to 6 miles per hour. One mile per hour is a slow stroll, 6 m.p.h. is a dog trot or fast walk. Some tractors are equipped with as many as three speeds forward; others regulate speed by the throttle. The r.p.m. of an engine governs

ten-truck farmer insists

on

EATON 2-Speed Axles

● Running ten big farms is a tremendous job.

And the man who does it – G. Alex Bailey of Potosi, Wisconsin, owner of ten Ford trucks, says: "I wouldn't have a truck without an Eaton 2-Speed Axle." Here's why he talks that way:

One of his jobs is hauling hogs and cattle to Chicago's stockyards – 200 miles away. Because Eatons give him better highway speeds on the level or on hills, Bailey "*saves about 20% in time and gasoline.*"

His round-the-farm hauling involves heavy loads and poor roads. Here Eatons give him the *extra pulling power* to keep rolling in any kind of going—and double the number of available gear ratios provide *money-saving highway speeds.* Ask your truck dealer how Eaton 2-Speed Axles can do a dollar-saving job for *you.*

Regular travelers—Plump steers like this make fast 200-mile trips to market on Eaton 2-Speed Axles – and owner Bailey saves hours of time and gallons of gas every trip.

"Just the ticket"—G. Alex Bailey (*right*) looks over a new Eaton-equipped Ford. E. W. Terwilliger, manager of Bailey & Walsh, Ford distributors of Lancaster, Wisconsin, agrees that Ford and Eaton make a swell combination.

EATON 2-SPEED *Truck* AXLES

EATON MANUFACTURING COMPANY, CLEVELAND, OHIO

MORE THAN A MILLION IN TRUCKS TODAY

IT'S A SNAP TO SHIFT

1. MOVE BUTTON
2. PUSH PEDAL

and your speed ratios ●●●● are now doubled ●●●●●●●●

enabling you to match the load to the road saving engine, time and fuel.

Other EATON *Products:* Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Rotor Pumps Conventional Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Spring Washers and Screw Assembly (Springtites) • Snap Rings • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

its power, so that at slow engine speeds power is reduced. Some operations, such as mowing, require high speeds; others do better work at slow speeds. A lazy man would not be happy behind a tractor travelling 6 m.p.h.

(13) The Rotary Tillers: Rotary plows are marketed under various names, but all are some form of a rapidly revolving shaft on which is mounted teeth or spikes which chew up soil and crop residues. The purpose is to break the ground and prepare a seed bed at one operation. They can also be used as weeders and cultivators. Their recent popularity is justified.

Various methods are used to prevent damage to the shaft when the teeth strike an obstruction — friction clutches which allow slippage and release mechanisms which throw single spikes out of operation.

The width of the cylinder varies from 12 to 26 inches. There are about fifteen on the market. Most of them are units and permit the use of no other attachments; a few have a full line of attachments.

The speed of the shaft demands rugged, heavy construction and plenty of power. Prices range from $200 to $700. Among American makes are Roto-tiller, Milwaukee M-E, Ariens, Roto-Hoe, and Cultiller. Two good foreign makes are on the market, the Simar, made in Switzerland, and the Howard Rotary Hoe, made in England. Both deliver in the U. S. for about $800.

(14) The Baby Four-wheelers: The gardener and small farmer or big farmer who finds that the walking tractor is a little too light for his needs and the standard field tractor too heavy and cumbersome, has a choice of a number of excellent baby four-wheelers. The advantages of a four wheel light tractor over a heavy, two-wheel garden tractor are mainly that the operator can give himself a ride and the engine does his turning and steering. A few two-wheel tractors have a clutch on each wheel, which permits a power turn. Otherwise this is done by the expenditure of muscle by the operator. On a gardening operation as large as two acres, the small four-wheel tractor will do a quicker and easier job than a garden tractor. But a four-wheel tractor costs more, and could not be used to mount many of the attachments, a feature which makes garden tractors attractive.

CROP INSURANCE

(Continued from page 74)

great a risk at the premium rates of his county. By not taking such applicants they manage to keep the premium cost of their insurance down, and the good farmer doesn't have to help support the poor one.

Then the county PMA chairman ex-

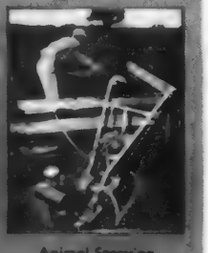
DOES A HUNDRED CHORES FASTER . . . BETTER . . .

This rugged work horse lightens and speeds garden and lawn tasks, eliminates the use of heavy farm equipment for small but tedious jobs. Turns easily at row ends, permits close set rows for more production in less space. Low cost attachments for the uses shown here, plus many more. As low as $151.50, 1½-3 H. P. freight extra.

WRITE FOR LITERATURE and name of dealer.

SEND FOR NEW DIAL-A-GARDEN GUIDE. This brand new Dial-A-Garden Guide tells you what, how and when to plant your garden crop, how much to grow, when to harvest, diseases and insect control. Send only 10c.

Sickle Bar Attachment



Animal Spraying

CHOREMASTER DIVISION
THE LODGE & SHIPLEY COMPANY
[illegible] Evans Street · Cincinnati 4, Ohio
CHOREMASTER—NEBRASKA STATE TESTED—10HP

17% GREATER TRACTION

No hop . . . no jerk . . . no slipping wheels on heavy loads. Get up to 17% more traction because of 1) ahead-of-axle attachment connection exerts down thrust and, 2) super wide 6" tires. Springfield tractors pull so smoothly handles aren't needed on attachments.

Get handy power anywhere with direct power take-off (speed reducer not needed). Two models — 2 h.p. at $179.50 — 3 h.p. at $239.50 (f.o.b. Springfield). All attachments available.

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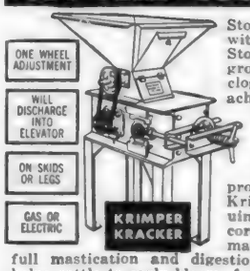
Home Crimp Your Grains CUT FEED COSTS 20%



Stop wasting grain with hammermills. Stop feeding dusty, ground grains that clog nostrils and stomach, are unpalatable, cause scrubs, bloat and tail-enders. Now roller-crimp your grains for greater feeding profits. New low-cost Krimper-Kracker genuinely roller-crimps corn, oats, barley, maize, wheat, etc., for full mastication and digestion. Full absorption helps cattle to early bloom, faster growth on less grain. Crimping makes grains bulky, doubles volume, makes 4 bushels do feeding work of 5.

PAYS FOR ITSELF QUICKLY!

Krimper-Kracker's low cost will amaze you—extra profits from one season can pay for it. A size for every farm—¾ to 25 HP, 4000 to 30,000 lbs. per hr. Requires only 1/6 the power of hammermills. Wagon box loader optional. Write for free literature and prices today! AGENTS! Honest, steady profits, write for territory.

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Tiger TRACTOR
Only $455.00
AMERICA'S FINEST SMALL TRACTOR!
A BRUTE FOR WORK
The only riding garden tractor with all these big tractor features!
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SNOW PLOW
GUARANTEED TO DO THE FOLLOWING:
• Pull a load of 4 tons
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USERS SAY:
"I am really amazed at the outstanding job this little unit will do . . . Beyond all expectations . . ."
UNCONDITIONAL MONEY BACK GUARANTEE
If the Tiger Tractor does not perform all of the normal farming functions for which intended or, well as the extraordinary operations listed above, we will refund your money within ten days of the time you receive the machine. All parts, materials and workmanship unconditionally guaranteed.
HERE'S REAL ECONOMY! You use only 2½ gallons in 8 hours operation! Power take off. Full line of accessories. All standard parts, serviceable anywhere.
Send for Free Circular Today.
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Department 900
Keyser, W. Virginia

"Beacon's Pride", Fed SUPERSOL, *Choice of Foremost Feeders* Wins Grand Championship!

November 18, 1950

Mr. Wallace Campbell, Mgr.
Brown-Forman Experimental Farm
Frankfort, Kentucky

Dear Mr. Campbell:

I know that you will be interested in some figures in regard to my feeding of the Shorthorn calf which recently was chosen Grand Champion of the Louisville Fat Cattle Show. He weighed 484 at the time of starting to feed for the show, and when he was sold he weighed 1,075 lbs. From the time that I showed him at the Kentucky State until he was shown at Louisville, he made a daily gain of 3.05 lbs. per day. My total feed cost was $130.00 for the entire feeding period.

My ration consisted of cracked corn, rolled oats, bran, barley and wheat. The barley was fed cracked until about the middle of August. At that time I started cooking barley and mixed some wheat with it. Of course I fed SuperSol from start to finish.

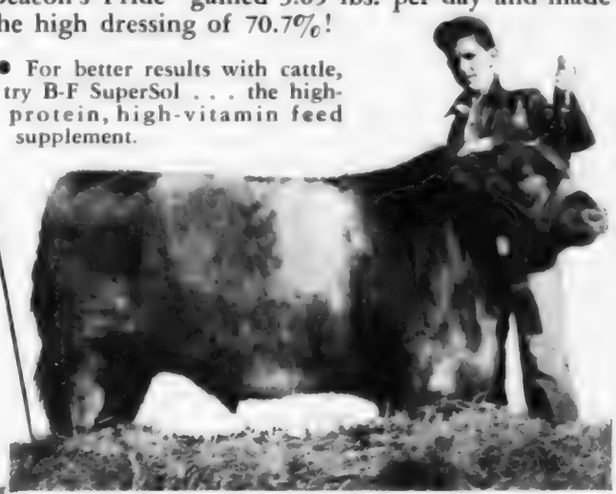
I was very happy to know that "Beacon's Pride" made the high dressing per cent of 70.7. And as you already know, he sold for $8.00 per pound, netting me $8,600.00.

Sincerely,
Kenneth Reed
Kenneth Reed

Louisville Fat Cattle Show's Top Award Goes to 4-H Clubber Kenneth Reed

Even foremost feeders in the *younger* generation . . . like Kenneth Reed, of Woodford County, Kentucky . . . have found that fitting cattle for shows and sales is simpler and more certain when the fitting ration includes B-F SuperSol. From start to finish of show feeding Kenneth's Grand Champion Shorthorn "Beacon's Pride" gained 3.05 lbs. per day and made the high dressing of 70.7%!

- For better results with cattle, try B-F SuperSol . . . the high-protein, high-vitamin feed supplement.



Kenneth Reed, owner of "Beacon's Pride" . . . 4-H Shorthorn Champion and Grand Champion . . . Louisville Fat Cattle Show, November 16, 1950.

(Available in pellet or granular form.)

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FATS and PROTEINS
CALCIUM, PHOSPHOROUS
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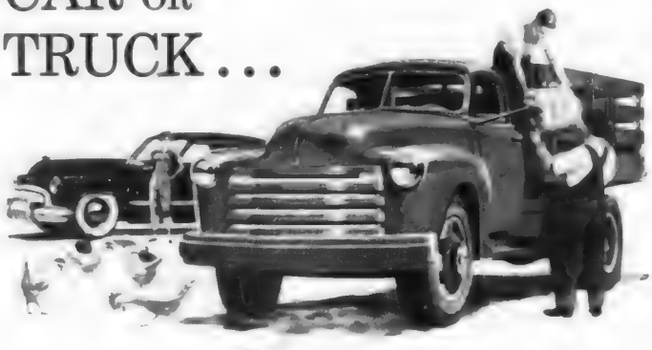
plus **VITAL PRODUCTIVE FACTORS**

If You Own a
CAR OR
TRUCK . . .



AC Spark Plugs, with Patented *CORALOX* Insulator, were Engineered Especially for You

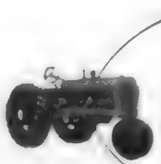
Your engine differs from other makes of engines, not only in design, but also in operating temperatures — Heat Range — behavior at high and low speeds —carburetion—and other factors that govern performance. That's why AC engineers work with most engine builders in America, to provide an AC Spark Plug type that will fire reliably in each engine, under all operating conditions.

AC's patented *CORALOX* Insulator is made of a revolutionary new material that enabled AC to solve the many problems presented by today's high-speed, high-compression engines—and by the different types of fuels now used in cars and trucks.

If you own a car or truck, *there is an AC Spark Plug type designed especially for you*—to fire better in *your* engine—to give you easier starting—to stay cleaner and last longer.

If you aren't using the new AC's, maybe you've been missing something. Get a set today from your favorite service man.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION



If You Own a TRACTOR

there's an AC Spark Plug, with patented CORALOX Insulator, designed especially to give better performance in your make of tractor. CORALOX stands up amazingly in rugged tractor service.

AC OIL FILTERS
AC FUEL PUMPS

plains to Betz that his county is actually a mutual company on its own. The premium that Betz must pay each year is figured on the loss record of corn farmers for the county. Over a period of years the premium must be adequate to pay off all the loss claims submitted by farmers holding policies in that county. If losses are low for a number of years the premiums are reduced accordingly, and if losses are high, premiums go up.

Before Betz leaves he signs an application for an insurance policy on his corn. If the application is accepted he later gets his policy. Then he reports the acreage of corn he will have for the year. It happens that his tenant farmer will get 50 per cent of his crop so Betz can get coverage on only one half of the total, or that part which is his. The tenant will have to get his own policy on the other half. The premium rate for the county multiplied by the number of acres of the crop which represents Betz's half interest determines how much he will owe for insurance. He must make his application prior to the planting season according to his county deadline. If his crop does well he has had the protection and probably still considers the insurance investment sound business. But if he takes a loss on the corn crop he reports to the county office and they send an insurance adjustor out to his farm. Usually there is one adjustor for each county, a local farmer who works for the government a few days a year.

The adjustor checks the yield of the crop against the average yield on the farm for preceding years or the average for the county. Then he takes a look at the neighboring farms to see how the corn did across the fence. If crops are good on all neighboring farms, he will probably conclude that Betz did a poor job of farming and crop insurance isn't designed to protect a farmer from his own inability.

But, if the low corn yield was due to an unavoidable cause such as a quirk in the weather the farmer receives a payment designed to cover his loss in producing the crop. The check usually comes within two weeks.

The reports of all adjustors are checked in the state crop insurance office to see that the farmer and the insurance corporation have been treated fairly. They're checked again in the branch office where claims are approved for payment. Such care in checking loss reports is to the farmer's advantage for it avoids payments to farmers in excess of their losses. And since it is a mutual company the losses in the county control the premium rates of all farmers.

The following year all Betz has to do to get his crop insured is pay his premium on time. Federal Crop Insurance is continuous year after year until it is cancelled by either the farmer or the Corporation. Betz must, however, if he decided to drop his insurance, cancel within two months before the seeding date.

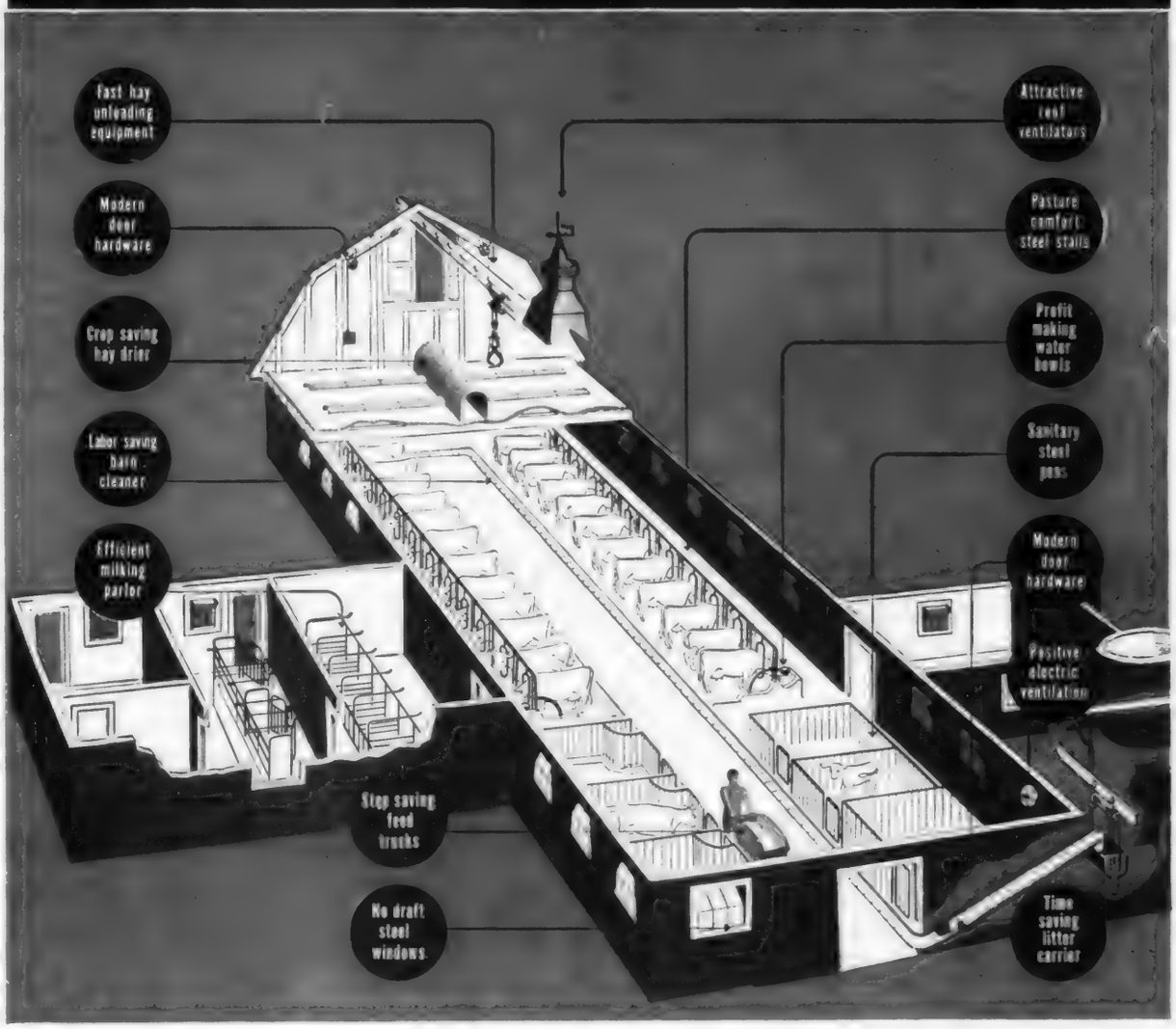
The salesmen for the county insurance program are, like the adjustor, local farmers working a few weeks out of the year on a straight commission. After a brief training period these part-time salesmen are ready to go out among their neighbors and sell insurance, and the more they sell the better it is for the insurance program.

Multiple Crop Insurance

The Federal Crop Insurance Corporation has great hopes for its multiple crop insurance program which was started experimentally in 1948. It is designed for counties where no one crop is of major importance. In these counties a farmer can purchase one insurance policy to cover all of his major crops, which in some locations number as high as seven crops. His insurance covers the investment in all of the insured crops instead of the income from any one individually. If his income from the combined crops falls below his insurance coverage he is paid for the loss. Premiums are low on multiple crop insurance because it is seldom that all of the crops on a farm will fail the same year. The risk for the entire county is also less than where they insure only one crop because low production on one farm may be offset by good crops on the other farms in the county. In 1950 there were 55 counties with multiple crop insurance covering such crops as alfalfa, sweet corn, tomatoes, barley, oats, lespedeza, sugar beets, and rice. The insurance administrators report a growing interest among farmers in this type of insurance, and the farmers in surrounding counties are asking for protection much faster than the young program can spread to handle their business.

EVERY DAY of the year — in EVERY PART of your barn

LOUDEN *Saves Time, Saves Labor and* MAKES MONEY FOR YOU



Year by year, farm-labor costs go up and up—and good help gets scarcer. So year by year, a modern Louden-equipped barn becomes more essential to protect your farm profits.

EXTRA STRONG—Modern in design and rugged in construction, Louden equipment LASTS YEARS LONGER. It helps keep your animals healthier—increases production of milk or meat. It helps get work done quicker and easier—AT LOWER COST. So it makes money for you *every day*.

LOUDEN THE LEADER — Ever since 1867, when William Louden founded the barn-equipment industry, the Louden organization has pioneered, introduced and constantly improved most of the equipment in today's modern barns.

And Louden has the most experienced barn plan department to give you the best arrangement for efficient operation.

TIME FOR ACTION — *The future belongs to those who prepare for it.* And this is the year to insure your farm-future with a Louden-equipped barn. You'll be less dependent on hired help — but when help is needed you'll find good hands prefer to work on Louden-equipped farms.

SEE YOUR LOUDEN DEALER — Shown above are many Louden items that can bring greater efficiency and more net income to your farm. For full details, see your Louden dealer — and send for valuable book described below.

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FARM BUILDING HARDWARE & EQUIPMENT

Get New Cost-Saving Barn Book

For economical ways to build or modernize your barn, get the brand new Louden BETTER BARNS BOOK, the most helpful book on barn-planning and equipment you've ever seen. If you plan to build or remodel, this valuable 100-page book is yours for the asking — but 10c to cover mail cost will be appreciated. Send NOW.

The LOUDEN Machinery Company
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The new Fox is lighter but stronger, smaller in size but with greater capacity and has many new features.

The NEW FOX *Forage Master*.....

is the only forage harvester that can be changed from hay to grass silage or corn in 10 minutes or less. One of the most revolutionary improvements in farm machinery in recent years. There is nothing quite like it on the market today. Not a gadget but a carefully engineered feature built right into the machine. When you buy a Fox you buy a time tested machine that has been field proven by over 20 years of successful operations. Of no other forage harvester can this be said.

The Corn Unit really handles corn and combination ensilage crops. Even in a muddy field or corn borer infested area, it will deliver.

The Grass Silage Unit has a five-foot mower bar and makes perfect grass silage from any standing hay crop.

FREE! *Write today for new catalog.*

FOX RIVER TRACTOR COMPANY

The Pioneer of Modern Forage Harvesting

5351 North Pankin Street

APPLETON FOX WISCONSIN

How A County Gets Insurance

Farmers living in counties which, as yet, have no crop insurance program will have to go on taking their own chances with the elements much as they have since pioneer days. And many farmers figure, "It has always been this way, why should I worry now." But farming is no longer the small home enterprise that it was a century ago; it is a business and businessmen know that insurance can be a good buy. A farmer's cash outlay is greater now than any time in history, thus his need for insurance is greater.

Realizing this, farmers in a county offering no crop insurance may be able to speed its coming. Each year the state offices of the Federal Crop Insurance program study their state to decide where new county insurance programs should be started. A factor they consider in placing new counties under the program is the need of the farmers in that county for crop insurance. But still more important to them is the amount of interest farmers in an uninsured county are showing toward getting insurance into their home area. A high interest helps assure the program of success; a lack of farmer interest can cause it to fail due to a small percentage of participating farmers.

In the words of Edgar F. Hempy, State Director of Federal Crop Insurance Corporation in Ohio, "We always give consideration to requests of farm groups from a new county when we are setting up a new program. We like to find those counties where the interest is high and the need is great, and if the farmers themselves tell us they want crop insurance we try to help them get it."

In Washingon, G. F. Geissler, who manages the whole crop insurance venture for the government says, "Our biggest trouble has been getting across to the farmers that this is a business proposition for which they must pay, and not a farm relief program or a government give-away idea. But the farmers are beginning to see crop insurance as a valuable aid to their business. It is nothing more or less than an opportunity for them to buy protection on their crops the same as they do on their automobiles or their health."

Who Pays For It

Crop insurance is only partly self-supporting. It is designed to take in enough premium money to cover the losses for which it must pay. This leaves the cost of administrating the program to be borne by the government. On the county level the PMA office takes on insurance as an added duty without added help to do the work, except the salesmen hired from among county farmers. Yet the government entered on the troubled waters of crop insurance because it saw in the plan a less expensive way of giving help to farmers in times of disaster than the old plan of going into a harrassed community with direct relief. It also helps stabilize the general agriculture picture from year to year.

Businessmen in rural communities are even faster at recognizing the value of crop insurance than are the farmers who deal with them. In many county seats, bankers ask a loan applicant if his crops are insured. If not the farmer goes out and gets the insurance before he gets his loan. Equipment dealers are taking the same approach when they sell equipment on the installment plan.

Many of the government administrators working with crop insurance look upon their program as a research project, one which can lay the groundwork for sound crop insurance procedures, and it is this groundwork that has always been lacking. Some of them feel that the government is not in the insurance business on a permanent basis, and that once the program is working soundly the information gained in it will be available to private and mutual companies who might then get back into the farm business with more assurance of success. When this day will come is only a guess. The government will probably continue to handle the job for many years, although it will be a number of years before the crop insurance is available to everyone. It looks now as though crop insurance is a good thing for the farmer, and there is little chance that Congress will drop it.

THE MYSTERY OF CORN

(Continued from page 59)

America are small and primitive; they differ decidedly in several characteristics from the modern varieties of the Corn Belt. Yet almost any American farm boy would recognize them instantly as corn. So some 4,000 years ago corn was already well on the road to becoming the unique cereal it is now.

In what part of America did corn originate? And what kind of wild grass was it that gave rise to the multitude of present-day varieties of corn?

A Wild Cousin

One theory has corn originating from a plant called by the Aztecs *teocintle* (now Anglicized to teosinte). Teosinte is undoubtedly the closest wild relative of cultivated corn. Like corn, it has tassels and ears borne separately, although its "ears" contain only five or six seeds, each enclosed in a hard, bony shell—characteristics that make teosinte a most unpromising food plant. Also like corn, it has 10 chromosomes, indicating that it is a closely related species. Teosinte can readily be crossed with corn to produce hybrids that are completely fertile or almost so. If corn came from teosinte, as many botanists have supposed, it must have originated in Guatemala or Mexico, for teosinte is found only in those two areas.

The second important theory is that

PUREBRED LIVESTOCK...or WISCONSIN Air-Cooled ENGINES

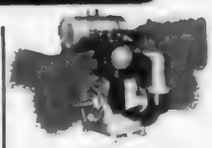
It Pays to Standardize

Buy your engines and engine-powered equipment the same way you buy purebred cattle. Stick to the "blood lines" and the "power line" that your experience and good judgment may dictate as being best for your purpose.

When it comes to engines . . . it pays to *standardize* with Wisconsin Heavy-Duty Air-Cooled Engines not only because these fine engines provide the most dependable and trouble-free service at all seasons, in any climate, but also because of these advantages:

You have no cooling problems with Wisconsin Engines, summer or winter. By standardizing on Wisconsin power, you have only ONE make of engine to become familiar with (no tricky gadgets or operating peculiarities to confuse you or cause trouble). You can get original factory parts and first-class servicing, not only from the authorized Wisconsin engine dealer or distributor near you, but also through the dealers and distributors representing leading farm machine builders who use Wisconsin Air-Cooled Engines as original equipment on their machines.

Yes, it pays to STANDARDIZE with Wisconsin power . . . 4-cycle heavy-duty engines from 3 to 30 hp., in single cylinder, 2-cylinder and V-type 4-cylinder models. Specify "Wisconsin Engines" for Most H-P Hours of dependable service. Write for literature.



Single Cyl., 3 to 9 hp.

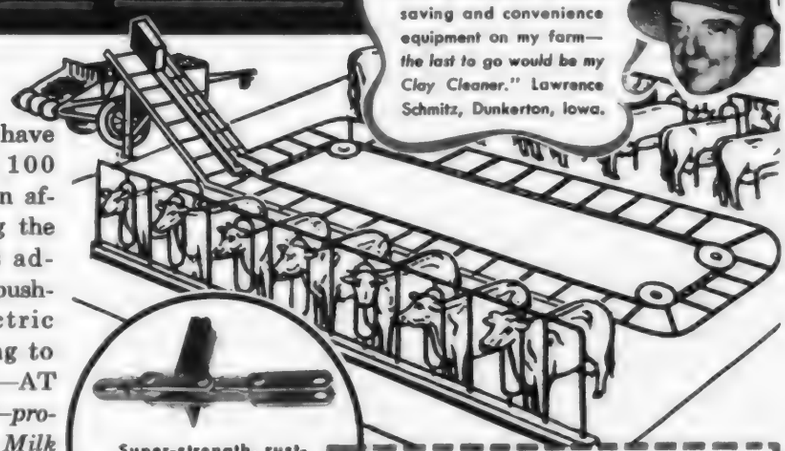
2-Cylinder, 7 to 13 hp.

V-type 4-cyl., 15 to 30 hp.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

CLAY ELECTRIC BARN CLEANER
ELIMINATES OUTMODED GUTTER SHOVELING

"If I had to lose, one by one, every piece of labor saving and convenience equipment on my farm—*the last to go would be my Clay Cleaner.*" Lawrence Schmitz, Dunkerton, Iowa.



3 SIZES . . . .

Economy Model A—small barns. Handles up to 25 cows. *Model B*—medium barns. Handles 25 to 50 cows. *Super-power Model C*—large barns. Handles 50 to 100 cows.

NO FOUL PIT

Manure moves smoothly—*minimum disturbance—minimum odors.* Paddles sweep all liquids and solids from gutter direct to spreader. No churning—falling back of manure at elevator. No smelly pit inside or outside.

8 CHUTE POSITIONS

Flexible design adapts easily to old barns or new. *Needs little concrete work.* Choice of 8 spreader-loading positions.

LESS MOVING PARTS

One motor—*one* continuous super-strength chain—*one* simplified drive unit—trouble-free operation.

Whether you have 15 cows or 100 cows, you can afford to bring the tremendous advantages of push-button electric barn cleaning to your dairy—AT LOW COST—*produce Grade A Milk—increase dairy profits.* Keep your help happy—your boys on the farm. Choice of 3 size cleaners means low cost—easy installation in old or new barns.

Get the facts NOW!

Super-strength, rust-resistant, heat-treated chain—up to 20,000 lbs. actual ultimate strength.

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RUSH FREE Electric Barn Cleaner literature plus catalogs on checked items.

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☐ Farm Windows ☐ Stalls and Stanchions
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I have _____ cows. I am building _____
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NAME _____
TOWN _____ STATE _____
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"On 120 acres we saved enough to pay for the Sure-Stand in One year"

Brillion
SURE-STAND
GRASS SEEDING
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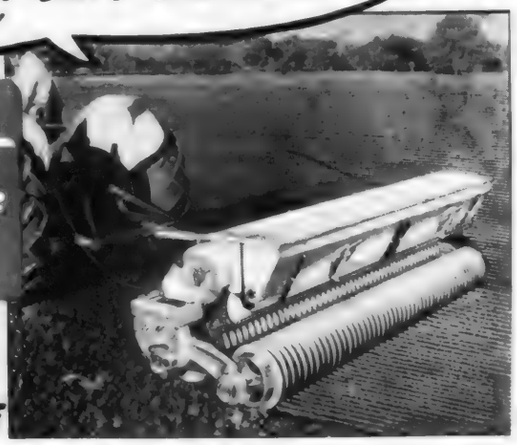

SEEDS LEGUME AND BROME
PULVERIZES & PACKS THE SOIL
ALL AT THE SAME TIME

Charles V. Simpson, Tetonka Farms, Waterville, Minnesota, says:

"Prior to the use of Brillion SURE-STAND Grass Seeder we were seeding at the rate of from 8 to 10 pounds of seed per acre. Beginning this year, through the use of our Brillion Seeder we have obtained very good stands of alfalfa at the rate of *4 pounds per acre*. In the case of our alfalfa brome mixtures we used 4½ pounds of brome and 2½ pounds of alfalfa. This mixture has formed a very satisfactory stand. On the 120 acres of legume seeding that we have done this year the saving in the cost of seed alone paid the original cost of the machine."

Write today for name of nearest dealer and the complete Brillion SURE-STAND story.

There's a model to meet your needs

in 5'4", 8'3", and 10'8" rolling widths in double and single box models

WRITE TODAY! for FREE NEW FOLDER

SS-34

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BRILLION • WISCONSIN

ROTO-HOE
America's Most Usable Garden Tool

makes Gardening SO EASY!

Roto-Hoe does the heavy work for you—you simply guide it between the rows. It pulverizes the soil, eliminates weeds, saves backbreaking hoeing and cultivating. Sturdily built for long, trouble-free life. Parts are low cost and easily replaceable if necessary. Simple power transmission and dependable 2 h.p. gasoline engine provide ample power for the job. Price for complete Roto-Hoe still only $134.

Acclaimed
everywhere shown as America's finest Garden Cultivator for small & medium gardens.

Many Uses
Roto-Hoe is ideal for preparing seed beds, mixing organic material with the soil, pulverizing compost heaps, etc. The motor can be used as a portable power unit for pump, saw, sprayer, grinder, etc.

Easily Converted to Roto-Cutter

The Rotary-tilling attachment can be easily and quickly replaced with Roto-Cutter attachment for perfect lawn care. Roto Cutter cuts 20" swath—reduces cuttings to a fine mulch. No Grass Blade, weed, plantain, regardless of height, escapes its sharp cutting edge. 20" Roto-Cutter attachment for Roto-Hoe only $40. Also available—new 12" trimmer and mulcher attachment, only $24.

Ask your dealer for demonstration or write for information. Dealer inquiries invited.

ROTO-HOE AND SPRAYER CO. BOX 7, NOVELTY, OHIO

corn originated in South America from a peculiar primitive plant called "pod" corn. Primitive pod corn today has virtually vanished; it is no longer found in pure form, but as an admixture in modern varieties. As described in early references, and as obtained by inbreeding from present-day mixtures, pod corn has its kernels enclosed in a pod or chaffy shell similar to that found in all other cereals—a condition which almost certainly was characteristic of wild corn.

Which, if either, of these two theories is more likely to be correct? Botanists, in attempting to determine the place of origin of a cultivated plant, place considerable reliance upon two criteria. One is the occurrence of wild relatives of the plant in question: the other is the number of variations or diversifications in the cultivated species itself. It is assumed that, other things being equal, the area where the greatest number of varieties is found should coincide with the center or origin, since diversification has progressed longer at the center than at the edges of the plant's present range. In the case of corn the two clues point in opposite directions; the wild-relative clue points to Guatemala and Mexico, where teosinte, corn's closest relative, grows; the diversity clue points to South America, where, on the eastern slopes of the Andes, occurs the greatest diversity of corn varieties found anywhere in America in a region of comparable size.

That Blue-Eyed Grandfather

Some 20 years ago my colleague, Robert G. Reeves, and I began working at the Agricultural Experiment Station of Texas A. & M. College on a series of genetic and cytological studies of corn and its relatives to test these two conflicting theories. We hybridized corn with teosinte to determine how the genes that differentiate the two species are inherited and how they are distributed on the chromosomes. We also hybridized corn with Tripsacum, a more distant wild relative of corn, which occurs in both North and South America. Our hybrids of corn and teosinte revealed that corn differs from teosinte not by a relatively few genes, as might be expected if the one had been derived from the other as a result of domestication, but by a large number of genes inherited in blocks. Our hybrids of corn and Tripsacum, the first such hybrids ever to be made, showed that the chromosomes of Tripsacum, 18 in number, differed greatly from those of corn. Microscopic studies of the reproductive cells of the Tripsacum-corn hybrids showed little pairing (a criterion of relationship) between the chromosomes of the two species. Nevertheless, there was some chromosome association and consequently some opportunity for exchange of genes. Especially important was the discovery that some of the plants that occurred in later generations of the Tripsacum-corn hybrid resembled teosinte in some of their characteristics. This dis-

Why it pays..and pays..and pays

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DEPTH-O-MATIC CONTROL—Powers tools into and out of the ground hydraulically. For mounted or pull-behind implements. Saves time. Saves labor.

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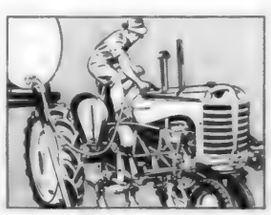

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covery led to the conclusion that teosinte might well be not the ancestor, but a descendant of corn—the product of the natural hybridization of corn and Tripsacum. Such a possibility had been suggested years earlier by Edgar Anderson of the Missouri Botanical Garden.

Since 1937, when we arrived at this working hypothesis, much additional research has been done on corn, pod corn, teosinte and Tripsacum, and upon their hybrids. There is abundant circumstantial evidence, but still no conclusive proof, that teosinte is the product of the hybridization of corn and Tripsacum. There is even more evidence to show that teosinte could scarcely have been corn's ancestor. Reeves, who has made an intensive study of the botanical characteristics of corn, teosinte and Tripsacum, has found that teosinte is intermediate between corn and Tripsacum, or is identical with one or the other two species in the 50 or more features in which they differ.

This, and other similar research, has made the teosinte theory increasingly difficult to accept. Meanwhile the theory that corn originated from pod corn has become more and more plausible. When a modern hybrid form of pod corn is inbred (a process that usually intensifies inherent traits) the result is a plant quite different from ordinary cultivated corn. The ear disappears and the kernels, now borne on the branches of the tassel, are enclosed in glumes, or chaff, as in other cereals. This pure pod corn possesses a means of dispersal, since its seeds are not on a heavy ear but on fragile branches. In the proper environment it could undoubtedly survive in the wild and reproduce itself. It has characteristics like those of many wild grasses; indeed, in its principal botanical features it is quite similar to its wild relative Tripsacum. Pure pod corn has virtually all of the characteristics we would expect to find in the ancestral form of corn. Furthermore, it is more than a relative of corn: it is corn—a form of corn that differs from cultivated corn in exactly the way a wild species ought to differ from its cultivated counterpart. Finally, all the hereditary differences between pod corn and cultivated corn are traceable to just one gene in one chromosome. Thus a single mutation can change pod corn to the non-podded form, and it has actually done so in my cultures.

The aboriginal wild corn that man began to cultivate undoubtedly had other primitive characteristics in addition to those of ancestral pod corn. Its kernels, for example, were probably small, hard and pointed. Kernels of this kind are found today in varieties of popcorn. Indeed, the U. S. botanist, E. Louis Sturtevant, one of corn's most astute investigators, concluded more than half a century ago that primitive corn must have been both a pod corn and a pop corn. Evidence is now accumulating to show that Sturtevant was right.

In the remains of prehistoric civiliza-

The farm that attracts 10,000 farmers a year

These pictures show a group of farmers on a tour of the 738-acre Purina Research Farm at Gray Summit, Missouri. More than 10,000 come each year at their own expense to see this farm. There's a reason!

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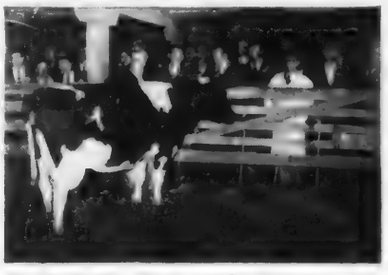

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tions unearthed in South America, pop corn predominates over other types. Pottery utensils for popping corn, as well as actual specimens of the popped grains, have been found in prehistoric Peruvian graves. Certainly there is nothing new about the pop corn which modern Americans consume so lavishly as part of the movie-going ritual. Pop corn is an ancient food, and it is quite possible that primitive man first discovered the usefulness of corn as a food plant when a wild corn was accidentally exposed to heat. This would have exploded the small, vitreous, glume-covered kernels, and transformed what, to people with no grinding tools other than their own teeth, was a very difficult food, into tender, tasty, nutritious morsels.

There is an interesting historical reference which lends support to Sturtevant's conclusion that primitive corn was both a pod corn and a pop corn. A century and a half ago Felix de Azara, the Spanish Commissioner to Paraguay, wrote of a particular variety of corn in Paraguay in which small seeds enclosed in "envelopes" were borne in the tassel. When the tassels were heated in hot oil, the kernels exploded to produce "a superb bouquet capable of adorning at night the head of a lady."

Pop Corn in Reverse

By a very simple experiment in our breeding plots, we have succeeded in duplicating exactly the corn Azara described. Pod corn was hybridized with pop corn and was then inbred to produce an earless plant bearing in the branches of the tassel small hard seeds enclosed in glumes. When a tassel of this pod-pop corn was heated in hot oil, it behaved like the corn of Azara. The kernels exploded, but remained attached to the tassel to produce the "bouquet" he described.

These recent findings have quite naturally given new impetus to the search for wild corn in South America, since the most convincing and conclusive proof of the pod-corn theory would be the discovery of a primitive pod corn still existing in the wild state. The search for a wild corn has not so far been successful in its primary objective, but it has been quite fruitful in turning up new types of corn, especially less extreme forms of pod corn, whose kernels are only partially enclosed in glumes. Perhaps wild corn will still be discovered in some remote protected spot in a region not yet thoroughly explored. The odds are at least even, however, that it no longer exists. Corn in the wild may well have been a plant with low survival value, restricted in its range, and already well on the road to eventual extinction when first used by man.

Great Bat Cave Discovery

In the meantime a wholly unexpected discovery, made within the past two years, has furnished direct evidence for the theory that primitive corn was both a pod corn and a pop corn. During the summer of 1948 an expedition sponsored by the Peabody Museum of Harvard University and led by Herbert W. Dick, uncovered many cobs and other parts of corn from the accumulated refuse in an abandoned rock shelter, known as Bat Cave, in New Mexico. This shelter was occupied from about 2000 B. C. to 1000 A. D. Uninhibited by modern concepts of sanitation, its successive generations of occupants allowed refuse and trash to accumulate in the cave to a depth of about six feet. Carefully removed and sifted by the archaeologists, the refuse yielded 766 specimens of shelled cobs, 125 loose kernels and various fragments of husks, leaf sheaths and tassels. The cobs are of particular interest, since they reveal a distinct evolutionary sequence. The oldest, at the bottom of the refuse heap, are the smallest and most primitive. These cobs and loose kernels from the same level prove that the earliest Bat Cave people grew a primitive variety of corn which was both a pop corn and a form of pod corn. The pod corn, however, was not as extreme as the earless synthetic "wild" corn described above. It probably represents a type already partly modified by domestication, more nearly like the weak forms of pod corn still found in South America varieties.

The Bat Cave corn has answered another of our questions: What is the relationship of corn to teosinte? The oldest

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and most primitive of the Bat Cave corn shows no evidence whatever of having stemmed from teosinte. But beginning about midway in the sequence there is strong reason for believing that some primitive genius crossed the original Bat Cave corn with teosinte, or it was contaminated by it accidentally. Thus the Bat Cave cobs suggest that early botanical investigators were not completely wrong in believing that teosinte played a role in the evolution of corn. Although teosinte clearly was not the progenitor of corn, it contributed its genes to corn's progress toward its present form.

The Bat Cave remains still leave unanswered the question: Where in America did corn originate? It seems improbable that corn could have been a native of the region where these remains were found, since corn is a moisture-loving plant and the region is now, and was then, quite dry. Probably it was brought into the Bat Cave region as a cultivated plant from Mexico. Whether corn was native to Mexico or had been introduced there still earlier from South America is an open question.

Redskinned Experts

How did the primitive pod-pop corn that the Bat Cave people grew 4,000 years ago evolve in so short a period, as evolutionary time is measured, into the modern ear of the Corn Belt? Some botanists are inclined to endow the American Indian with unusual abilities as a plant breeder. If the great changes that have occurred in corn in this relatively brief period are the product of his skill, he was indeed remarkably adroit. The corn from Bat Cave does not, however, support this view. On the contrary, there is no evidence that the Bat Cave people were any more concerned with plant improvement than they were with sanitation. If selection was practiced at all, it was probably an unplanned "negative" selection—the good ears were consumed and the leftover nubbins were used for seed. Nevertheless, thanks probably to accidental hybridization with teosinte and with other races of corn, there was a gradual increase in the average size of ears and kernels and an enormous increase in total variation during the 3,000 years of the Bat Cave's history.

The evolutionary sequence in the Bat Cave indicates that four principal factors operated in the evolution of corn during this period: 1) The pressure of natural selection, one of the most important suppressive factors in evolution, was greatly reduced: 2) mutations from the more to the less extreme forms of pod corn occurred: 3) corn was modified by contamination with teosinte: 4) crossing of varieties and races produced new combinations of characters and a high degree of hybridity.

All of these factors contributed to a tremendous increase in variation, so that when man finally did begin to practice selection in corn, he had a rich diversity

FARM BOOKS

Nutrition and the Soil

by Dr. Lionel Picton
The Devin-Adair Company, N. Y. $4.00

W. F. Patten, who is a professional farm manager, was skipper of a Navy tanker during the last war. "Whenever we were in port, my ship would be loaded with food and I'd see cargo ships put tons and tons of food into their holds, food that was raised on our farms and represented the fertility of our soil. Next to the loss of human life, this loss of our soil fertility seemed to me to be one of the most wasteful things in the war."

This is the way a farmer naturally looks at food, as the product of his labor and of the fertility of his land. Patten and other thoughtful farmers who share his concern would be interested in the way Dr. Lionel Picton looks at food and the soils that produce it. Dr. Picton, one of the foremost British medical men in the field of dietetics, has spent a great part of his career studying the relationship of food and human health. In carrying out this study he has also had to go into the problem of the relationship between the crops produced and the fertility of the soil and also the nutrients that are removed from food by processing.

That part of the book which deals with the soil and the healthful or deficient foods that are grown on it emphasizes the importance of humus and natural fertilizers in the production of health giving foods. In this field Dr. Picton is in complete accord with Sir Albert Howard who has written so extensively on this subject.

In the field of food preparation, Dr. Picton points to a waste of nutrients that is appalling. The prison diet of an English prison, for example, was found to be a bare subsistence when it was first used and to have become a starvation diet in later years due to a change in the processing of the food even though it was fed in the same quantity as before.

(See the Farm Book list on page 140)

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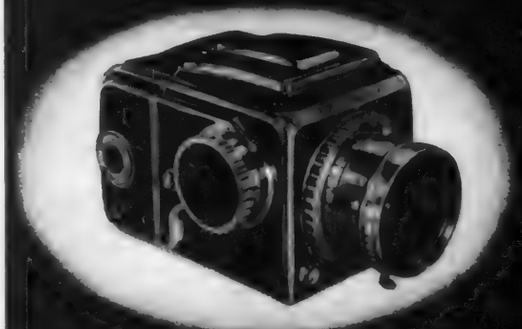

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THE AUTHOR: Paul C. Mangelsdorf, now on the Harvard University faculty, has made corn his life work. His interest began 30 years ago when he was a student at Kansas State College in 1920. Later he worked with E. M. East and D. F. Jones who participated in the development of hybrid corn. From 1927 to 1940 he worked on corn in Texas, developing hybrid corn for that state. It was while engaged on this project that he became interested in the relatives of corn and its origin. His original article on the origin of corn was published in *Scientific American*.

NITROGEN FROM TANKS

(Continued from page 31)

ground until taken up by the plants.

The farmer planning to apply gaseous nitrogen would estimate the needs of his crops much the same as he would for bagged fertilizers. He would start with a soil test which would show him the pounds of nitrogen needed in a field for the production of the crops he plans to plant. Remembering that the nitrogen percentage in ammonia is about 80 per cent he would know that he must apply five pounds of ammonia for every four pounds of nitrogen needed by the crop.

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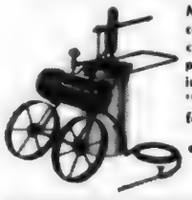

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the fertilizer in the soil until plants can use it. The hydrogen part of the ammonia is converted to water, leaving the nitrogen to go about its fertilizing duties. And all of this nitrogen is available to plants; there is no loss.

The equipment for putting nitrogen in irrigation water is simple indeed. The ammonia is run right into the flowing water through tubes and a metering device from the tanks, which rest on the edge of the ditch. Companies selling the nitrogen haul the tanks to the farm.

Money and Ammonia

Among the advantages of ammonia fertilization is the important argument that it is cheaper than other sources of nitrogen. When a pound of nitrogen comes at 16 cents in nitrate of soda, 13 cents in cyanamid, and 10 cents in ammonium nitrate it costs only six cents in the gas form. Even with the added cost of equipment for applying anhydrous ammonia the average farmer can still use it and save money over the bagged nitrogen fertilizers. He should remember, however, that he makes two trips to get his fertilizing done where he might make only one if he used bagged nitrogen. He makes one trip for the gaseous nitrogen and another for the potassium and phosphate where these are used.

At this early stage in the development of the gaseous ammonia industry the big drawback from the farmer's viewpoint is how he can purchase and store the fertilizer. In many sections it is still out of the running because it is generally sold in 10,000 gallon tank car lots. The farmer who could purchase and put to use such a quantity would need a storage tank where he could keep it until needed. And a tank for 10,000 gallons, for instance, or one carload, costs around $4,000. As the practice spreads, more and more farmers will buy ammonia fertilizer much the same as they buy their bottle gas.

The solution to this dilemma might lie in cooperative ownership of equipment by a group of farmers, or in dealer ownership in an agricultural area. In Mississippi a number of retailers stock and even apply the gaseous ammonia to farmers fields for less cost per pound of nitrogen than would be paid for bagged nitrogen.

Scientists in many parts of the country have also checked the effects of ammonia on the physical properties of soil and here too the reports are in favor of the gaseous fertilizer. Ammonia helps mellow the soil, keep it friable and less likely to pack.

Distribution problems still limit the areas where farmers can buy this new fertilizer. Where they've tried it, they like the system and the quick boost it can give a growing crop.

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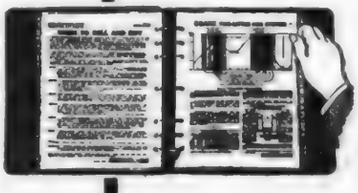

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CATTLE RUSTLING TODAY

(Continued from page 49)

the Cattle Sanitary Board and the New Mexico Cattle Growers' Association, the case was cracked. Then the trial was postponed until August, 1950, because Catron county lacked funds to hold court.

The court, once it was solvent, learned that DeGraftenreid's bill of sale had been drawn up in Springerville, Arizona. A handwriting expert brought from Houston, Texas, spent three hours on the witness stand and concluded the bill of sale was forged. The jury recommended leniency because of the rustler's age. When DeGraftenreid was about to travel to the state penitentiary for a visit of from 18 to 36 months, the judge suspended his sentence and instead fined him $750.

Sometimes rustlers take a truckload of stolen cattle to a hideout where they slaughter the animals and bury the hides. Although the distribution and sale of meat is subject to rigid inspection there are always some unscrupulous dealers willing to take a chance on buying illegal beef.

Not all rustlers butcher animals or forge bills of sale. A thief may attempt to change the brands to match his own and then market the stolen cattle through legal channels. This practice, as old as the West, is riskier today than ever. Law enforcement officials have developed an uncanny ability to spot worked-over brands.

Still another type of rustling is more reminiscent of the early days. In the open range states of the West a cattle thief will sometimes explore the ranges within 100 miles of his own ranch to locate his neighbor's stock. Then he takes his own cattle on a cross-country trail. As they pass the newly located cattle, his cowboys cut out a few head and mix them in with the home herd.

If caught on the trail this man claims the cattle just mingled, as cattle will, and that he was unable to separate them. Such a rustler may be regarded with suspicion, but does not run much risk until he actually starts changing brands or trying to market the stolen cattle. If caught at his home ranch with another rancher's cattle, he claims he was planning to drive them back home. He may even present the owner with a bill for the grass they have eaten.

Ralph Miracle, Executive Officer of the Montana Live Stock Commission, reports an ingenious variation of this method discovered recently in the Northwest. A man in Idaho recorded a brand used by a Montana rancher. It is said he made a number of rustling forays across the line, stealing many head of cattle and driving them back to his home range. Once there, he marketed them with comparative safety as the brand on the cattle was legally recorded in his name.

When Montana authorities discovered what was going on and asked the state of Idaho for help, the man was arrested and tried in Federal court at Butte. Al-

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though the boy charged with helping him round up the cattle pleaded guilty and turned state's evidence, the jury acquitted the defendant. The state of Idaho, did, however, cancel the brand in question.

The surprising thing is that so many rustlers get away with their crime as long as they do.

Any western farmer who raises cattle for market must have an official brand granted by his state government. The state registers these brands and prints them in a book. Some of these volumes are heavy enough to bend the reading table. New Mexico, for example, has 25,000 brands recorded, and Montana more than 60,000.

Passports For Cattle

When moving his cattle along a state highway, a truck driver must carry a stock shipping permit. Any truck carrying livestock may be halted and inspected by the state highway patrol, and the cattle in the truck must tally in number and brand with the permit.

At the stockyards shipments pass through the corrals and brand inspectors check all animals to see if they conform to shipping records, a copy of which is sent them by the shipper. They also check all brands. If they think a brand has been changed they clip the animal's hair for a closer look. By checking the brand book they can determine the original or legal brand.

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not lawfully belong to the shipper this fact is reported. Some states return these cattle to the owner. Others permit the animals to be sold and send the check to the rightful owner rather than to the shipper. In either event, officials investigate the case. If they find sufficient evidence, the illegal shipper is hauled into court on a cattle rustling charge.

Most of the western states have livestock commissions. A major function of these commissions is to prevent rustling, and their efforts frequently pay off. In the first six months of 1950 the California Bureau of Livestock Identification returned 285 head of cattle valued at $43,115 to their rightful owners. Brand inspectors at the stockyards spotted these animals as they passed through the yards.

California ranchers pay about three quarters of a million dollars a year to maintain their brand inspection service. It looks like a losing proposition, but the cattlemen believe that thefts would soar well above that figure if the inspections were discontinued.

In every range state, cattlemen have their own organization, many of which were formed expressly to combat rustling. They advertise standing rewards of from $100 to $1000 for evidence leading to the arrest and conviction of rustlers. In the past year the New Mexico Cattle Growers' Association has shelled out $2400 in $300 rewards. The Wyoming Stock Growers' Association offers $500, gets a chance to pay it only once during the average year.

Rustling Costs The West

In the West the anti-rustling campaign costs a lot of money and keeps hundreds of men busy. In New Mexico alone the Cattle Sanitary Board keeps from one to three inspectors in each county. Sixty state policemen constantly roam the field. The staff of the State Game and Fish Department, U. S. forest rangers, and Bureau of Land Management field men all cooperate in the effort to check livestock thefts. Volunteer sheriffs' posses operate in a number of counties. These efforts are, for the most part, efficiently organized. Yet H. B. Hening, publisher of the New Mexico Stockman, and an authority on rustling, estimates that less than ten per cent of the raids on livestock are discovered and the rustlers punished.

There is a general feeling, however, that eternal vigilance has reduced the number of large-scale thefts, which are now rare. In one case 43 yearling steers were stolen from a Wyoming rancher and no trace of them was ever found. As this is written, the manager of a ranch near Deming, New Mexico, has just been accused of stealing 97 head of cattle and is bound over to the district court under $30,000 bond. But these are exceptional instances.

Many ranches exceed a hundred thousand acres. It isn't possible for range riders, state policemen and sheriff's posse-

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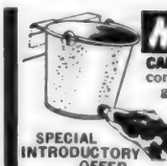

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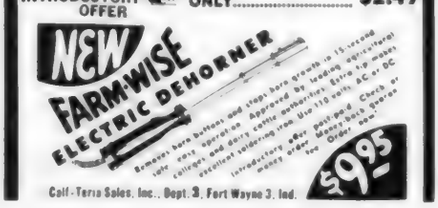

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men to be everywhere at once. There's plenty of wide-open country in which the rustler can make his raids. In fact, he frequently feels so safe from immediate pursuit that he takes the time to butcher the cattle where he finds them.

Rustling Everywhere

Nor is rustling limited to the once Wild West. Stockmen in every section of the nation complain that they are in constant danger of losing cattle, hogs, and sheep to thieves. Most of the large stockyards, even in the East, keep a brand inspector around to check cattle that come in from western states. Sheriffs from distant counties often visit large city stockyards in search of missing stock belonging to one of their home county tax payers.

Many a Midwest farmer has gone to his hog lot in the morning to find a puddle of blood, the only remaining trace of one of his favorite shoats. Away from the rangelands of the West this is called, not rustling, but just plain stealing. The high price of meat prompts many of the thefts, and when meat is rationed the stockman must be doubly vigilant.

They're Hard to Count

Western ranchers sometimes distort the rustling picture by filing exaggerated reports of cattle losses.

Consider the case of a rancher on spring roundup. He and a handful of cowboys must collect the cattle scattered over 50,000 acres of land that may be spectacularly scenic but is also hard to move around in. After several days of hard work they gather the herds and count heads. The records don't tally; there should be two dozen more cattle. Chances are the rancher will report them as stolen, but it's probable that subsequent search will turn some of them up as live strays. And eventually skeletons will be found in out-of-the-way places, skeletons of cattle which have died of disease or may even have fallen to mountain lions.

How to Handle Rustlers

In the Old West cattlemen made and enforced their own laws, dispensing their version of justice on the spot. The penalty for rustling was sure death, sometimes from a six shooter, more often from hanging.

For years the big cattlemen were virtually absolute rulers of western ranges. If they didn't like the way the courts handled rustling they took the law into their own hands, and did so with impunity.

Ranchers often carried their powers to excesses during the 1890's. A few aging cattlemen still recall the Powder River Invasion. In 1892 northern Wyoming ranchers organized to exterminate rustlers. They let it be known that they planned to hang 25 men and drive another hundred "clear to hell and gone out of the West."

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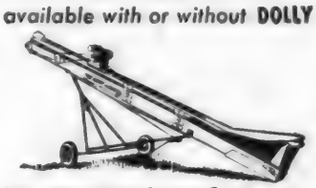

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cowboys hired in Texas and Colorado, the Wyoming cattlemen raised a small army and equipped it for a campaign.

A special train left Denver on April 6, 1892, and headed north on the Union Pacific tracks. It consisted of three cars of horses, a flat car with several wagons, a baggage car, a caboose, and a chair car with drawn blinds for the 75 hired fighters and one surgeon. There was even a "war correspondent" from the Chicago Herald. The train unloaded at Casper.

The cattlemen opened their campaign by laying siege to the KC ranch on the Powder River north of Casper. They had accused Nathan Champion and Nick Ray, operators of the KC, of stealing cattle. Champion put up a remarkably courageous defense, but after an all-day siege both he and Ray were killed.

The ranchers' army then started a march on the town of Buffalo. But by this time, word of the invasion had spread and the countryside was in arms. Forced to withdraw, the invaders occupied the log buildings of the TA ranch on Crazy Woman Creek. A changed and aroused public opinion was at work. By morning, a force of three hundred men under Arapahoe Brown had surrounded the place. For two days they pumped a steady hail of bullets on the invading ranchers.

News of the fight reached Cheyenne, and Governor Amos Barber solicited Federal aid. Colonel J. J. Van Horn led three troops of U. S. Cavalry from Fort McKinney.

The battle at Crazy Woman Creek reached a climax on the afternoon of the second day. The attackers "armored" a wagon by lashing a breastwork of logs to it. They intended to push in with this primitive tank and set fire to the buildings. Arriving just in time to stop this project, Colonel Van Horn placed his men between the forces and conferred with the besieged army under a flag of truce. They surrendered, and the cavalry troops escorted them to Fort McKinney.

Legal proceedings against the ranchers limped along for months but never got to court. All the members of the captive army were discharged early in 1893. Although they went unpunished, most of the big ranchers knew that failure of the Powder River Invasion had ushered in a new era.

Today the western states differ considerably in their treatment of convicted rustlers. Sentences range from a few months on probation to long terms in the state penitentiary. In Wyoming, where the usual sentence for a first conviction is a year and a day in the state prison, ranchers sometimes grumble that the punishment is too light and does little to discourage cattle thievery.

On the other hand, Idaho courts frequently hand out stiff 14-year prison terms. In the past two years they have sentenced more rustlers to such terms than

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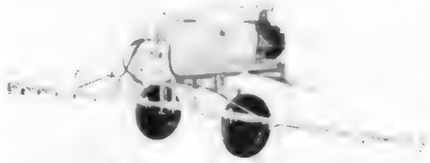

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in the previous 20 years. If this represents a trend the little man with a pickup truck and a rifle may think long and hard before he knocks over a calf that doesn't belong to him. Or maybe not. At least the shadow of a dangling noose apparently did little to deter the rangeland's robber barons of three generations ago. The cattle lands, since then, have taken on an appearance of law and order, but even so it looks as though rustling is a permanent by-product of the livestock industry.

THE AUTHOR: William S. Milburn is a southwesterner by choice. He lives in Tucson which he prefers to the Midwest where he spent his boyhood. After high school he vagabonded through the Southwest for a year. During this period he lived on cattle ranches and worked on citrus farms. He followed this with two years in the University of Arizona. In 1938 he returned to Kansas City as associate editor of a business magazine for farm machinery dealers. He served in the army during World War II and then went to Chicago, where he worked four years as managing editor of American Lumberman. But the call of the Southwest was too strong. He returned to Arizona in 1948. Since then he has worked as a free-lance writer and completed his much-interrupted college education.

FARM MANAGEMENT FOR HIRE

(Continued from page 79)

should he ever delve into the question.

The farm's records and accounts are kept up to date and summarized in monthly, quarterly, and annual reports. The owner can review the operation of the farm at any time and is urged to visit the farm and keep in touch with its operation. Three monthly reports are submitted to her showing the income and expense for the month, the work performed on the farm, and the inventory of livestock. Four times a year she receives a description of conditions on the farm and a crop outlook, and annually she is presented with the plan for the coming year and the budget. She also receives an annual financial and inventory statement.

These are the records that tell Mrs. Lovens, or any other client, how management is serving her and determine whether or not she wishes to continue employing professional management. Since she purchased the farm eight years ago, these records show that she has averaged $3,348 profit each year on her 180 acre farm. This figure represents the amount she receives after paying for all labor, including management, feed, seed, fertilizer and lime, depreciation on equipment, buildings and fencing, taxes, interest on the mortgage and all repairs to buildings and equipment. But the figure does not tell the whole story for it doesn't show the increased productivity of the land due to good management practices.

Tenants and Managers

Bailey operates Mrs. Lovens farm on a direct basis, that is, he hires the farm operator on a salary and directs his work, but this is not the only, nor even the most common arrangement. Very often the manager is asked to represent the landlord on a tenant operated farm. In this case the professional manager contributes his

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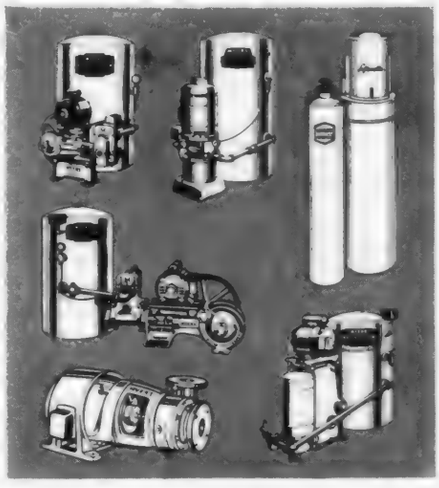

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management training for the landloard and looks after the landlord's interests in the partnership. The manager is more a collaborator with the tenant than a director of his labor. The management recommendations, after all, will directly affect the tenant's income and the tenant will have to be convinced that they are for his good. Once a manager has proved himself to the tenant, however, this relationship works very well. The tenant knows that he is dealing with a man who understands agriculture and is out to make a profitable enterprise of the farm.

Some farm tenants feel that employing a manager is showing lack of confidence by the owner. Professional farm managers insist, however, that they are needed for the same reason that prompts a ship owner to engage a pilot to assist the ship's skipper in shoal waters and harbor currents. Their specialized training supplements that of the farmer. "Once I have been able to show the value of my part of the job to a tenant," one farm manager says, "I usually find a curious thing taking place. Tenants and operators from neighboring farms will see me drive in and a few minutes later they will have some reason for paying a visit. They will ask a few questions and soon we are having a regular seminar. I know that I've secured two or three clients in this way, by having the tenant get to know me and recommend me to the owner."

"Sometimes the addition of a manager makes it possible for a tenant that was failing to pull out of it," he continued. "I have a farm like that right now. The farm was owned by two groups of heirs, a man and his sister owned half and their fourteen cousins owned the other half. The poor tenant was caught in a situation where all of them had a say, but no one was boss. All they could agree on was that they wanted more money for themselves and less spent on the farm. One of the women even accused the tenant of stealing chickens from the farm; even a count of the flock wouldn't convince her that she was wrong. It turned out that she had seen a yard full of feathers and made her deductions—didn't even know that chickens molted. They finally sold the farm and the new owner asked me to manage it. I am recommending that we keep the old tenant and give him the chance he deserves."

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Managers accept both direct operations and tenant operated farms and they work with general farms and specialized farms. Owners of dairy farms, poultry farms, orchards and other specialized farms are customers for management.

The Management Fraternity

The managers who direct these varied types of arrangement are themselves a fairly heterogeneous crew. Some operate as individuals, some are employed by land holding companies, some have formed partnerships, and some have organized or gone to work for management companies. As in most other fields today, specialists appeared. These are men like C. M. Long of Lafayette, Ind., who devotes his full time to making the overall plan for a farm and leaves the supervision of the work to others. There are other men who have specialized in engineering, bookkeeping, soil fertility, and other specific fields. There has been a demand for specialists to divide the work in management companies and clients have furthered the trend by demanding special types of work from individual managers and from the management companies. Farm owners have demanded managers to do specific jobs such as appraisals (the most common of these special tasks), labor efficiency studies, planning the drainage system, tax work, and general consultation on the farm operation.

Code of Honor

The farm managers, knowing how much damage a few bad apples could do to the whole profession, which is based on a relationship of trust between client and manager, have organized themselves into the American Society of Farm Managers and Rural Appraisers and have formulated a code of ethics for the profession. A committee on ethics is maintained by the society for the purpose of seeing that the confidence of the public in the members is merited. One method used by the society to maintain the professional standards of the profession is the granting of the special title of Accredited Farm Manager to these members of the society who qualify in terms of experience and who have passed rigid examinations set up by the society.

The secretary of the society, H. E. Stalcup, is prepared to supply a copy of the code of ethics and lists of farm managers in any part of the country to any one who is interested. Inquiries should be directed to him at Storm Lake, Iowa, stating location and acreage of land to be managed.

Who Hires Management

Most of the clients of farm managers are city people who do not live on a farm, but have purchased a farm as an investment, or have inherited one. "The easiest client to sell," one manager said the other day, "is the business man who recognizes that management is as much a require-

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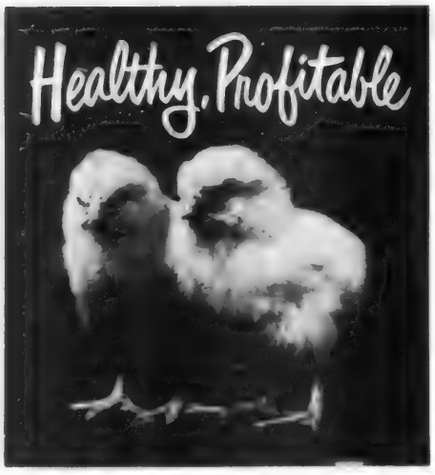

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ment of good farming as seed or fertilizer."

Perhaps the hardest person to sell is the farmer who is doing a good job of managing his own farm and sees no need to hire outside management because no apparent need exists. This is, of course, perfectly understandable; a farmer who is doing a perfectly competent job of managing his own farm feels that he has about as much need for a full time professional manager as he has for a rumble seat on his tractor to accommodate a back seat driver. Occasionally, however, these farmers will hire management for special jobs such as the preparation of income tax reports, working out the details on transferring the farm from father to son, efficiency studies, etc. There are even instances of a new farm owner hiring a professional manager to direct his farming efforts as he learns the game. A more common use farmers make of the professional managers is to arrange for them to take over the farm in case of death or in case they are called into the armed forces. "Most farmers wouldn't bat an eye at paying a stiff price for a new piece of equipment, but he would balk like a steer at paying for consultation with a competent manager," the head of a management company said recently. "Yet think what they would gain. How much would it be worth to a farmer if he had been told about hybrid corn a few years before he started using it? Our clients were using it long before the neighboring farms started. Or how about ladino clover or cross breeding pigs? How much would you figure he would save if a labor efficiency study showed him how to run his dairy with a third less effort expended? I don't know what the figure would be, but one thing is sure, it would be infinitely greater than the cost of consultation."

Farm managers have their favorite clients and they also have clients they occasionally feel like murdering. The clients that rank high with managers are those that take an interest in their farm without trying to do the job they have hired a manager to do—these are the men, who recognize the professional status of the farm manager and respect the job he is doing. Among the clients who put lines of bitterness around the manager's mouth are those who make deals with their tenants behind the manager's back, those who complain about the manager to the world at large without ever discussing

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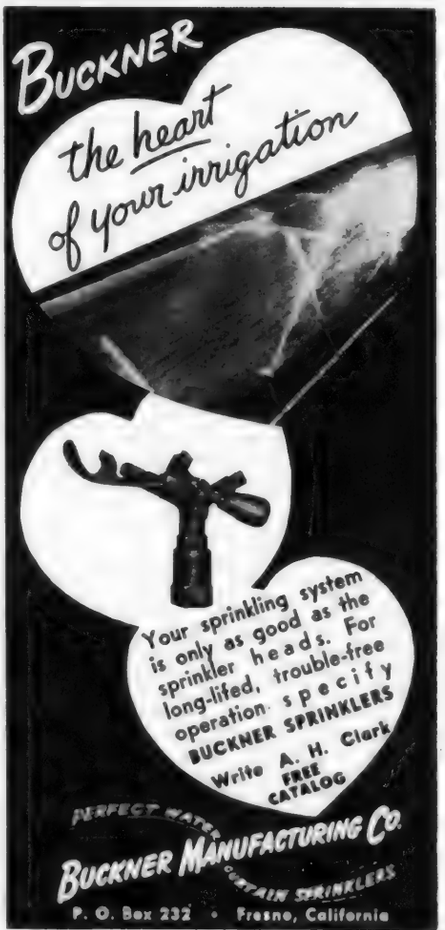
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their dissatisfaction with him, and above all those who keep track of every move of the manager and the tenant or farm laborer. One of this last group was a man whom we shall call Eugene Maxwell who visited his farm daily and demanded an accounting of every minute of his tenant's time. Not only did he demand and get a time schedule; he double checked it by looking over the work. If a roof had been repaired he would count the number of shingles that had been laid; if manure had been spread, he would pace off the distance from barn to field and estimate the time it took to drive it. After the farm manager had found three replacement tenants, he himself was ready to quit and gave up the farm as a bad job.

Farm managers will not admit that there is a farm that they cannot manage, but most of them will agree that the closest thing to an unmanageable farm is the hobby farm. As one of them put it, "If you wanted to clear a room of farm managers real quick just have a prosperous looking fellow walk in and say, 'I have 500 acres of land. I don't want to make any money on it—just run it as a hobby.' That would really scatter them. We want to operate a farm for a profit. Trying to operate any other way is a headache."

There are many marginal farms that would profit, but could not afford the extra financial burden of management even though their incomes were increased. These are the farms that are too small or which have too little crop land to be economical units. Sometimes managers can bring about specialization and change them into workable units, but this cannot always be done and usually involves a sizeable expenditure.

Cost of Management

Many people have the idea that professional managers are out to squeeze a quick dollar out of the farm without regard for the soil or the future of the farm. "Nothing could be further from the truth," says H. E. Stalcup, Secretary of the American Society of Farm Managers. "Quite aside from the fact that we are reputable professional people who know agriculture and want to see it advance, we would go broke farming that way. Every manager knows that the first year he operates a farm he puts in more work than he is paid for. It is only after he has whipped things into shape and got the farm operating smoothly that managing the farm is a paying proposition."

And what is the farm manager's pay? This, of course, varies between manager and manager and between farm and farm. It is dependent on the services that the manager offers and the amount of management that the farm demands. Some managers and management organizations charge a flat fee for each farm managed; others have an acreage fee, and some combine an acreage fee with a per cent

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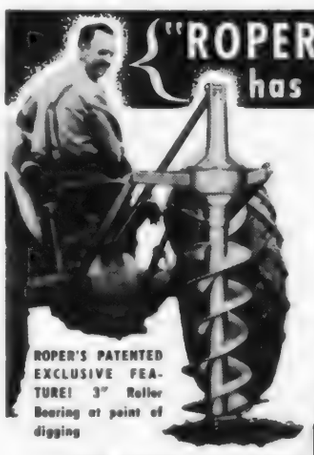

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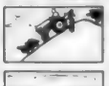

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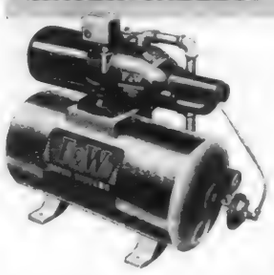

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of the gross income. It is not uncommon to find a single manager using all of these methods or variations of them.

The manager's pay for managing a tenant operated farm is often a per acre charge ranging from $1.00 to $2.50 plus a per cent of the owner's gross income from the farm. Some arrangements are based on a per cent of the owners gross with no average charge. On direct operations, that is where the manager is responsible for hiring the labor, a common practice is to charge a per acre fee that is based on the number of acres involved with a minimum charge per farm. A manager might charge $2.50 an acre for farms under 1,000 acres, $2.00 an acre for farms between 1,000 and 2,000 acres, and $1.75 an acre for farms over 2,000 acres.

On the Lovens farm, for example, the per acre charge of $2.50 for directly operated farms does not produce a total equal to the minimum charge set for managing a farm. Mrs. Lovens is therefore charged a flat $750.00 a year which is the minimum charge for this service.

For special work such as consultation, tax accounting, or overall farm planning, special fee arrangements are made that may be based on the total job, the time involved in doing the work, or the acreage of the farm.

In contrast to the cost of management the professional managers like to point to a study made in Illinois which traced the difference in income of 1,000 farms over a ten year period. The factors that were found to make the difference between the most profitable and the least profitable farms were almost all factors that were the result of management. Price of grain and other farm produce, cost of labor and other such items that are not too susceptible to management control were far down the list in importance. The professional manager's conclusion—you pay for management, but it often makes the difference between success and failure on the farm.

THE AUTHOR: W. F. Patten is entitled to use the initials A. F. M. after his name which means that he has passed the various examinations and the rigorous qualification requirements of the American Society of Farm Managers and Rural Appraisers of which he is an enthusiastic member. His management work centers around Toledo, Ohio where he lives and near which his own farm is located. Among his clients is the France Stone Company whose large land holdings he manages. During the war he was in command of one of the largest of the Navy's sea going tankers.

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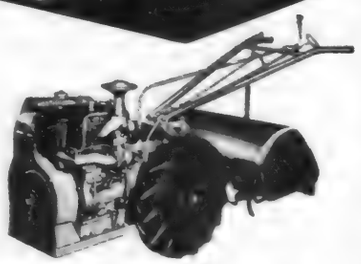

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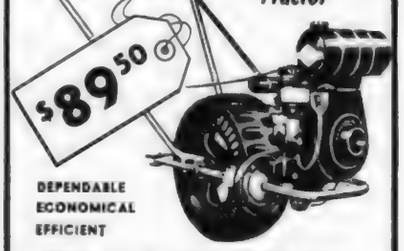

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THE MILKING MACHINE

(Continued from page 40)

cows should then be milked dry and the teat cups removed individually if the quarters milk out at different rates.

Occasionally a farmer has a cow in his herd that causes him no end of trouble. For some reason best known to her and the devil she refuses to let her milk down in the time it should take. Some cows have required 15 minutes to be milked dry by a good milking machine. If the farmer can't convince such occasional problem cows that this is bad business he is generally better off to sell the cow and replace her with a more business-like animal in order to keep his total chore time within reasonable limits.

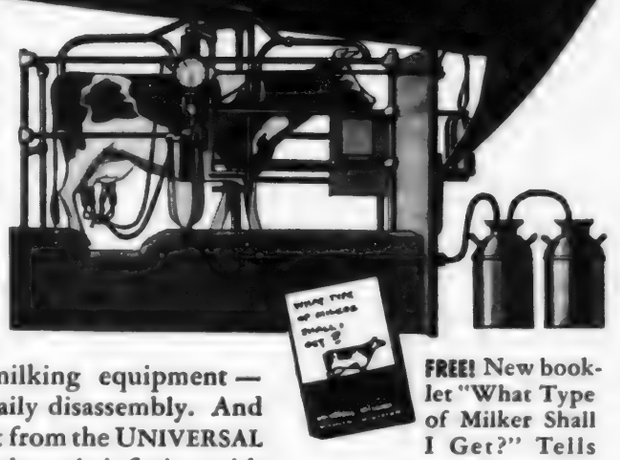
Milking Goats

The goat owner, like the owner of cows, would like to have his hand work done by machines, but he is more likely to delay the purchase of a milking machine. Perhaps this is because his milk producing animals have only half the number of outlets found on cows.

Most milking machine companies do build milking machines for goats, but because of the limited market for these contrivances, goat milkers are only a sideline. Varying reports on the success of goat milkers continue to crop up. Some goat owners use milkers satisfactorily, but still more of them can't get goat and machine together on a good working plan. Sol Engels, of Genesee Depot, Wissin, milks nearly 200 goats with milking machines and likes them. Engels is the exception. It takes such a short time to milk a goat with a machine that most owners consider the mastitis, from machines left on the goat too long, a threat to their herds. Most standard teat cups may be used for goats but the vacuum must be lowered to nine inches and the claw altered to handle two instead of four teat cups. The small size of many goat herd makes the milking machine a poor investment.

But goats or no goats, the milking machine has earned for itself a permanent place in the line-up of farm equipment. Across the country the various college extension services are conducting an increasing number of milking machine clinics each year. At these gatherings farmers learn the fine points of operating a milker profitably. The worth of the milking machine is also spread by word of mouth from one farmer to the other. It is a labor saver and herein lies its greatest virtue. Properly handled it is a highly efficient machine. Improperly handled it can be a trouble causer, but as its proper use is learned, the milking machine will clinch its position of importance in the dairy world.

MORE PROFIT IN YOUR MILK CHECK with the UNIVERSAL MILKING PARLOR



Why? Because you use less labor. The UNIVERSAL System milks, weighs and conveys the milk to can or cooler — all automatically. No milk to carry. And with the simple UNIVERSAL Washer you wash and sterilize the entire milking equipment — thus you eliminate daily disassembly. And of course, you'll profit from the UNIVERSAL Calf-Nose Inflation—the only inflation with the off-center opening that is designed to eliminate crawling and milk-lock.

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THE BOSS HEN

(Continued from page 28)

Some Observations and Experiments on Social Behavior in the Domestic Fowl, and *Some Measurable Effects of Social Organization in Flocks of Hens.* In the latter paper can be found the formula for determining the probability factor used in evaluating the number of observed pecks given by members of a flock. For the chance mathematician who owns a flock the following will be found helpful:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\left[\left(\xi x_1^2 - x_1 \xi x_1\right) + \left(\xi x_2^2 - \bar{x}_2 \xi x_2\right)\right]\left(\frac{1}{n_1} \cdot \frac{1}{n_2}\right)}{n_1 \cdot n_2 - 2}}}$$

Though the ponderous titles and the weighty formulae favored by scientists are often amusing to the lay mind, the results of their work are of real value in our lives. The scientific value of these experiments has been to throw some light on the survival chances in nature of the various members of the flock and the chances of survival of an organized flock as compared with one that is in a state of flux. No final conclusions have as yet been reached, but the information can be added to similar studies that have been made on geese, quail, and other birds.

Of practical value is the knowledge that birds kept in a disturbed state of organization lay fewer eggs and weigh less than those in a stable flock. And of importance is the indication that birds kept in complete isolation will lay more than birds in a stable flock. Such findings may well play a part in the development of the individual laying cage and in the management practices of practical poultry men.

An element of poetic justice entered into one of the experiments when Dr. Guhl and his associates decided to try their hand at throwing the pecking order out of kilter. The bottom bird from a stable flock was selected as the subject of the experiment. This bird, which had been pecked and mistreated by every hen in the flock, was given an injection of male hormone. After the injection had taken effect, the hen was returned to her old flock. Immediately she took on each of her old tormentors and, by trouncing all of them, rose in short order to the position of queen. As boss hen, she could now demand and take the best of everything. And did the memory of her former harried life make her a more benevolent despot? It did not. As she put to flight her last opponent, this rejuvenated hen stood in the center of the hen yard and crowed. Then she pushed the old queen out of a warm nest and laid an egg.

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The LEGUME-AID package is appreciably larger than others in size and contains more of the bacteria-carrying humus. This extra amount of inoculant makes it easier to treat your seeds more thoroughly at planting time.

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Whether planting clover, alfalfa, lespedeza, peas, beans, lupines or any other legume, it pays to assure maximum nitrogen fixing power by treating seeds with the famous "Inoculant in the Carton." LEGUME-AID is neither sticky nor gummy. It pours freely, clings to seeds closely, yet never clogs the drill. Ask your seed dealer, or write us direct.

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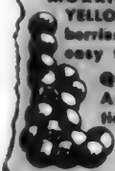

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THE SURPLUS IS GONE

(Continued from page 34)

pared. The job of increasing the production of nitrogen is slower and very much more expensive. Nitrogen is taken from the air—in fact, the air is something like 80 per cent nitrogen—so the supply is inexhaustible, but the process by which it is removed is complicated and requires huge capital investments.

We have only started to use nitrogen. In Iowa, for instance, the farmers have never been able to purchase more than 20,000 tons of ammonium nitrate a year. There are about 200,000 farmers in Iowa which means that if the available ammonium nitrate were divided equally, each farmer would receive 200 pounds.

Actually, 200 pounds of ammonium nitrate *per acre* is a very profitable amount on ground planted to corn where no other nitrogen is supplied by a plowed-under clover crop. Iowa alone could use as much nitrogen in fertilizing just its corn and oat crops as is contained in one million tons of ammonium nitrate. Nitrogen manufacturers will have to double and redouble and then double once more their nitrogen fixation capacity during the next ten years. Producers of phosphate and potash will have to double their production in the same period.

Farmers don't use much fertilizer when corn sells for 75 cents a bushel. They increase their use of it considerably when corn is worth $1.25; and they will increase it phenomenally when corn reaches $1.75 a bushel.

The Second Jack

This same economic prodding holds true when it comes to using the second jack which is a rapid increase in the use of celluloses, such as corncobs and grass silage in the feeding of ruminants, and the increased use of urea as a protein for ruminants. When corn is relatively cheap, farmers don't mind feeding it to cattle and sheep, even though they know that these ruminants can make satisfactory gains on celluloses such as pasture, hay, corncobs, and silage. When corn is $1.25 a bushel there is quite an inducement to feed less grain and more cellulose. And when corn reaches $1.75 they will learn how to feed grass silage, how to produce better pastures, and how to put up better hay. They will start feeding corncobs in combination with molasses and urea; and they will certainly learn that urea is as good if not a better protein for ruminants than soybean, cottonseed, or linseed meal.

Incidentally, urea is a nitrogen product, taken from the air, and it will require extremely heavy capital investment to increase its production. Its value is so great, however, that, like ammonium nitrate, its supply will be increased many fold to meet the terrific demand.

The Third Jack

The third help in boosting production is the further improvement of farm machinery with better fertilizer attachments.

NATIONAL CHAMPION for Milk and Butterfat

May Korndike Mercedes Matchless 3031408, Classified "Excellent."

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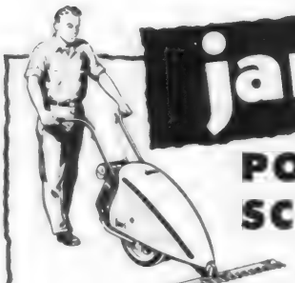

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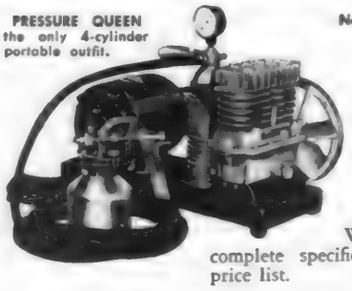

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better equipment for spraying insecticides, better selective weed killing agents, better harvesting equipment and the like. Improved farm machinery has already made a bigger contribution to the increased productiveness of American agriculture than most people realize. Tractors let farmers plant crops at a more timely date than they were able to do with horses. Tractors save man-hours that can now be spent on the better care of livestock. Modern harvesting machinery made it possible to save more of the grain that is grown. Modern haying equipment saves more hay of better quality. Modern spray type irrigation will permit us to use supplemental irrigation on much of the rolling land. Under the stimulus of high prices, farmers are going to equip themselves with the finest machinery possible. And we will build bigger and better machine sheds to house it.

The Fourth Jack

Applying the same genetic principles to the breeding of poultry and livestock that caused hybrid corn to make such a phenomenal contribution to increased production will be a fourth production stimulant. Already, approxi.tely 20 per cent of all the chickens hatched in Iowa are bred to produce hybrid vigor. The Minnesota Number One boar is another example of this trend. Commercial firms have now entered the field and are enlarging the production of hybrid boars. This increased use in the livestock field of the inbreeding and cross-breeding techniques that produced hybrid corn is already giving us increased efficiency in the production of poultry and meat.

The Fifth Jack

The fifth jack calls for the increased use of contour farming, strip cropping and terracing in all of the areas where these practices can be profitably used. We will turn more and more to the use of them because these practices bring greater yields and tend to conserve the soil for the future. Farmers won't bother with contouring, strip cropping or terracing if grain is cheap, but when grain prices rise they learn to produce more bushels to the acre.

The Sixth Jack

Though we have no new frontiers to exploit, we do have land that can be made to produce something more edible than crawfish or horn toads. Our sixth method of increasing production will be to extend and improve drainage and irrigation where these two practices are needed and to clear land that is overgrown. A farmer may take a chance on losing one crop out of four before investing in costly drainage improvements if corn is selling for 75 cents a bushel. But if he loses a crop worth $1.25 it is painful and if the corn is selling for $1.75 he won't think of taking a chance.

The same is true of irrigation. Water cannot be brought profitably to the land

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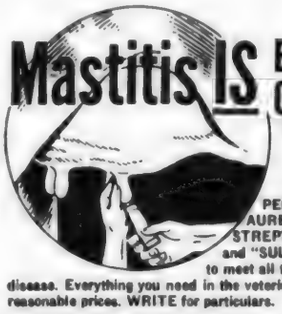

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when corn is cheap, but when it reaches $1.25 to $1.75, more land will be put under irrigation and irrigation will be brought to marginal land to improve the yields.

The Seventh Jack

The seventh jack to production will be the use of better rotation systems for land conservation and improvement, better and more soil erosion control practices, and a very great improvement in the pasture lands which will then be able to produce ever increasing quantities of meat. These practices will do no particular good in improving the 1951 production, but they will contribute tremendously to the increased production over a ten year period.

The Eighth Jack

The saving of larger amounts of grain and hay and the improvement of the quality of this feed will be accomplished by artificial drying. This new farming practice requires a substantial investment in equipment, but the return over a period of years more than justifies the initial cost if the farmer is saving high-priced grain and hay, and if he is adding substantially to the quality of these crops.

ROSWELL GARST appears in *The Farm Quarterly* for the first time as an author with this article. He has, however, been the subject of several articles. Garst entered the hybrid seed corn business in 1930 with his partner Charles Thomas. Since then he and Thomas have watched their business grow from the production and sale of 300 bushels in 1930 to 350,000 bushels in 1950. Garst served on the original National Corn-Hog Committee which planned the government program on these two related crops back in 1933. He has led in the education of farmers, both by demonstration on his own farms in Coon Rapids, Iowa, and by writing, on the better use of fertilizer, the feeding of corn cob meal and urea to cattle, and the artificial drying of crops.

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High feed value, higher market price, insurance against rain damage in the field and spontaneous combustion in the mow — those are just some of the *extra profits* you gain when you install a Hartzell system for curing hay in the mow.

Proof? Ask your county agent . . . a neighbor who has a Hartzell system . . . your favorite farm paper editor.

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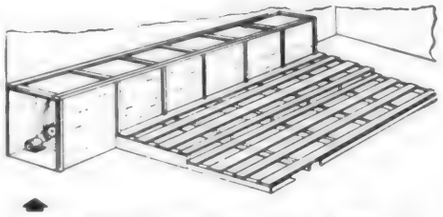
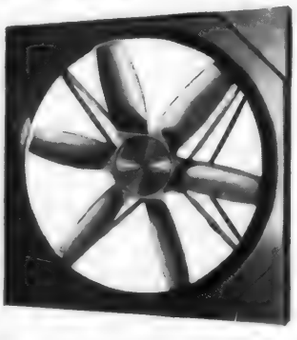
Write today for your *free* booklet showing installation photos, sketches, diagrams and other data.



A widely-used system for hay drying. In narrow mows the air-tunnel is at one side; in wide mows, it is centered and the slatted floor is on both sides.



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The Prospect

The challenge that faces farmers to increase the production of food as rapidly as the population is increasing is one that can be met—but not easily. The first step in meeting it calls for an understanding that it is not temporary or short-lived. It is a permanent challenge that will become more difficult to meet during the 1970's than during the 1960's, more difficult in the 1960's than we will find during the next decade.

If farmers feel that the present high prices are due solely to the Korean War or the preparedness program and that they will last only for a year or two, they will not make the capital investment necessary to increase production. When they decide that prices are high because of our growing population, they will be willing to invest in drainage, in irrigation, in new machinery, drying equipment, and the other aids to larger production over a long term.

The Korean War and the immediate supply and weather situation will influence farmers in their day-to-day decisions regarding such matters as whether to buy feeder cattle this month when prices are high or to wait until the shortage of feed has driven the price of cattle down. Such decisions are more influenced by the immediate situation which is only partly the result of population pressures. It is when long time capital investments are contemplated that the rising population line should exert its real influence.

Farmers will be supported, price-wise, during the coming period not by a Government subsidy, but by a much surer support—an ever-growing demand for food from an ever-increasing population that wants to continue to eat as well or better than they do now. That is the surest price support there is, actual demand.

We will use all of our known jacks, and new developments not even contemplated in this article will undoubtedly make contributions. Some of them, like aureomycin, which is a powerful antibiotic and also a growth stimulant, may intensify the problem while contributing

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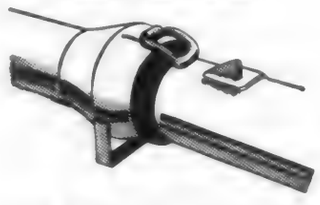

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. . . . with controlled moisture
The Moulton really Portable Irrigation System
- Available in any size
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to its solution. Other developments may materially affect the food supply by extending the range of our food plants.

Malthus may catch us eventually, a good many sensible people think that he will. But if we, as farmers, exert ourselves and use all of the proven jacks we have in the tool shed, we can keep ahead of him for quite a while.

Neither the Korean War, nor the gigantic rearmament program has caused the present situation. Both are emphasizing it, of course, and both hurried it. It is our growing population that is responsible for it and increased production of food will be almost equally necessary whether the future brings a continuation of the armed truce, whether it brings war, or whether it brings what we all hope for—peace.

THE FARM'S PICTURES

Cover by David and Hy Peskin

5—Carl Mansfield. 8—Eva Luoma. 22—Kosti Ruohomaa-*Black Star*. 24—Arthur Lavine-*Black Star*; Dept. of Forestry, Univ. Illinois; USDA. 25—Carl Mansfield. 26—Joe Clark; Joe Munroe; Chart-Charles Koch. 27—Vories Fisher. 28 and 29—*Life* photographer Wallace Kirkland ©Time, Inc. 30 and 31—Shell Chemical Corp. 32—Acme Photo. 33—Margaret A. Ahlers. 34—Joe Munroe; J. W. McManigal; *Standard Oil Co. (N. J.)*-Vachon. 36—A. Halvorson. 37—Bettmann Archive. 38 and 39—Photo credit as indicated. 40—Smithsonian Institution. 41—Carl Gifford. 42—Jane Latta. 43—Jane Latta; Map-Michael Bizzari. 44 and 45—Jane Latta. 46—*Western Ways*. 48—Artwork-Joan Nevins. 49—Charles W. Herbert-*Western Ways; Western Ways*. 50—Joe Munroe. 51—Bolens Products Division Food Machinery & Chem. Prod. Corp.; Gravely Motor Plow and Cultivator Company; Cheston L. Eshelman Co. 52 through 55—Photo credit as indicated. 56 through 58—K. Chester. 59—Painting by Stanley Meltzoff; K. Chester. 60—Kosti Ruohomaa-*Black Star*. 61—Harold M. Lambert. 62 and 63—Kosti Ruohomaa-*Black Star*. 64—Jesse Lunger. 65 through 67—Joern Gerdts-*Pix*. 68—Peirson-Moore Co. 69—Blaw-Knox Co.; Gen. Pictures. 70—S. W. Industrial Heating Engineers; Peirson-Moore Co. 71—Bud Gourley-*Shostal*. 72—Bob Taylor. 73—*Acme Photo; Mercury Pictures;* USDA-*Bureau of Entomology* and *Plant Quarantine;* Joe Munroe. 75—Lee-*Evanston*-GTA Digest. 76—Joe Munroe. 77—Joe Clark; Kosti Ruohomaa-*Black Star*. 78—Federal Security Administration; J. I. Case; Carl Mansfield. 79—Joe Munroe. 131—Joe Munroe. 133—J. F. Bennett.

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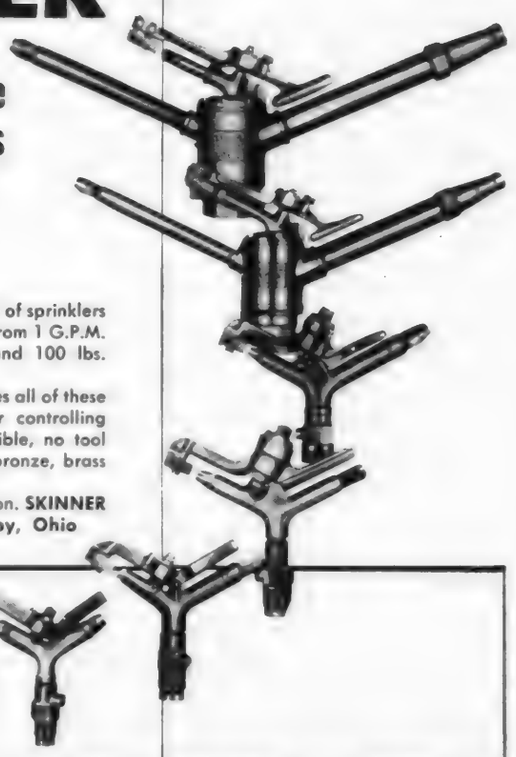

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"Pioneer and leader in irrigation for nearly a half century"

GREATER PROFITS from Farm Crops!

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No farmer who can afford the original investment necessary to put in a crop, should be without the assurance of a **good crop.**

Gorman-Rupp high pressure centrifugal irrigation pumps are **dependable** and provide an unfailing supply of water for producing larger and better crops. **They Never Fail.**

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For Convenience and Beauty
Complete Protection for Stock

A well constructed gate is the only safe means that has ever been devised to bar a roadway to livestock. The Kentucky Gate makes it unnecessary to get out of your car, open the gate, go back and get in the car, drive it through, get out again and go back to close it.

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HOW TO BUY A FARM

(Continued from page 27)

buildings, fences, and roadways and basically good soil an ideal savings bank. He can legally lose tax money on the place for five years, after that time the Bureau of Internal Revenue may take a keener interest in his farming.

Those who expect their farm to pay its way had best be extremely wary of the abandoned or badly rundown farm. Unless the reason for the farm's condition is well known and can be overcome, it is safest to assume that the basic fault lies in the soil, climate, or other factors beyond the control of the previous owners. To assume, without iron-clad reasons, that the failure lay in the shiftlessness of a former owner is to court failure. True, there are many excellent examples of farms being resurrected, but it usually took years of expense and labor before they were profitable.

An Hour in the Courthouse

"When a farm buyer has found a place he likes, it would pay him to spend some time in the courthouse at the county seat before he buys it," Earl Kinkaid, a longtime county auditor, has said. "Most people would be surprised at how much legitimate public information is available here about every farm in the county. In my office, for instance, you can find out what the taxes are that will go with the place and also how much of a school district debt you are buying into. In this county the tax assessment would remain the same even though the ownership was changed, but in some states, Kentucky for example, this isn't so and the new owner would save himself a shock if he found in advance that his farm was to be reassessed at 80 per cent of the purchase price. In these days of rising prices this has resulted in tripling the taxes on some farms.

"Another item that can be found here and one that is often pretty amusing," Kinkaid continued, "is whether the owner has ever made an appeal on the assessed valuation of the place. We had a man in here the other day who had just come from the farm where the owner had described the house and land in glowing terms. He then found and read the owners description of the place in the appeals records. It seems that the pasture was so poor that it was unfair to classify it as agriculture land; it was more of a wild life refuge. And the house that he had been boasting about—it would cost hundreds of dollars to put the roof into shape and the termite damage was so great that it was unsafe to use the dining room.

"He could also find out about the road situation in this office. We can tell him whether there is any chance of new roads being built and we can also tell him whether the county, township, or state is responsible for the upkeep of his road. The same thing is true for ditches. It is

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among horses, mules, cattle, sheep and dogs call for treatment with SPOHN'S COMPOUND. A stimulating expectorant. Acts on throat and bronchial tubes to hasten relief. Used by world-famous horsemen for 55 years. At drug stores, or direct, postage paid—75c and $1.50. **Spohn Medical Co., Box 14, Goshen, Ind.**

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The Complete Simplex Soil Test Outfit: All the reagents and apparatus necessary for 100 to 300 tests for each of 15 important soil chemicals plus 4 reserve tests and tissue tests. F.O.B. Cleveland $36. All prices subject to change.

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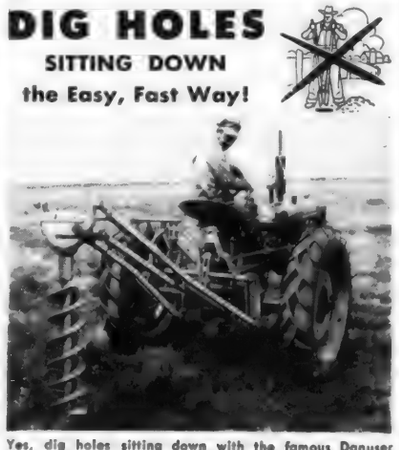

Yes, dig holes sitting down with the famous Danuser Digger—it takes less than a minute per hole with this time- and labor-saver! With it, you can dig over 500 holes a day. The Danuser Digger is quality built, Timken bearings throughout . . . easy one-man operation. Fits popular tractors. Augers from 4" to 24". For literature illustrating adaptation on your model tractor, write:

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important to find out who is responsible for maintaining the ditches that border the farm; it may be the owner."

The County Agent usually has his office in the courthouse or nearby. He knows the agricultural situation in the county and probably knows the farm in question. He can discuss the nature of the enterprise that should be on the farm and the farming problems in his county. He knows, for example, what the labor requirements are and what the labor situation in the county is; he has kept close track of the crop and livestock practices in the area and is charged with the job of helping farmers find and use the best methods. His advice on the operation that is planned for the farm will be of great value. He can also help the prospective buyer have soil samples taken and soil tests run.

The Soil Conservation Service maintains offices in many counties. Here the buyer can look over the soils maps of the area and find the basic soil types on the farm and a written description of each soil type. He can find if the former owner has had a conservation plan worked out for the farm.

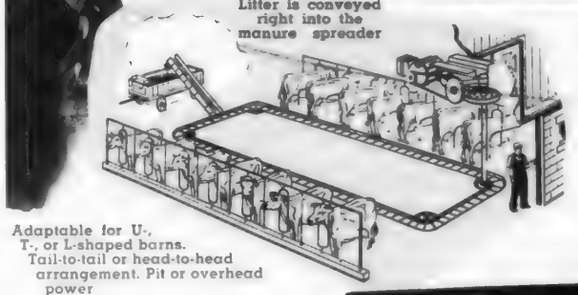
The Production and Marketing Administration office (still called AAA in many counties) is another source of valuable information. They can tell what acreage allotments have been imposed on the farm in the past or are currently in effect. In tobacco growing areas, for example, the size of the tobacco allotment will make a big difference in the price of the farm. They may also be able to say whether the grain storage buildings have been examined and whether they are acceptable for storing grain under government loan.

What Will the Farm Cost

"If you could look ahead and see the prices that will be paid for agricultural products, then you would know what you should pay for a farm," says John Orebaugh, the real estate man. "Some of my friends tell me that I am not looking ahead with enough optimism when I worry about today's farm prices. They may be right, but I can look back to 1921 and to 1914 and even to 1907 and 1897 and remember what happened to farmers who bought farms at boom prices a few years earlier and then had to pay for them during a depressed period. When I see land selling for $225 an acre that sold for $85 in 1940, and land that would have brought $50 an acre ten years ago selling for three times that, and land selling for $70 to $80 an acre now that wouldn't have been farmed then, I feel that there is danger and that a man should be able to pay at least 75 per cent of the price of the farm in cash to be safe."

There are two general methods of arriving at a price on a farm. One of these is to compare the farm land and buildings with other farms in the area that have been sold recently and arrive at a com-

WISE FARMERS ARE MECHANIZING



Adaptable for U-, T-, or L-shaped barns. Tail-to-tail or head-to-head arrangement. Pit or overhead power

All indications point to an increasing shortage of farmhand help. At the same time, demand for milk is going UP. That's why your investment in a Leach Barn Cleaner (or Silo Unloader) will pay off in many gratifying ways. More and more, the key to profitable farming is MECHANIZATION.

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Now — during the coming months is the best time to install your Leach Barn Cleaner. You will want an estimate. This the nearest Leach dealer will give you without obligation. Just tell us on a post card that you're interested.

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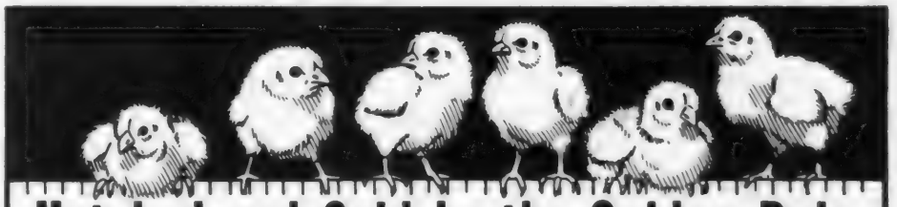

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When you buy from Golden Rule, you buy top *quality* poultry, greatly enriched each year by R. O. P. cockerels from famous breeders! Fourteen money-making breeds and four outstanding cross breeds offer exactly what you want—whether it's extra high egg production or plump, tender broilers. Hatched under skilled OPIA supervision, every chick is Ohio-U. S. Approved, Pullorum Passed, backed by 28 years of scientific Balanced Breeding. Liberal guarantees: 100% live delivery; 100% true to name and color; 98% livability for 3 weeks—losses over 2% replaced free.

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How to buy a Farm

"Too many mistakes are made in buying farms." That is the opinion of our staff of farm managers, charged with the management of hundreds of farms, ranches and plantations . . . Buying a farm at today's high prices is not easy or simple, especially for city people. In thirty-two years in the business of managing farms, we have observed many costly mistakes in buying farms, made by people who later came to us for consultation or management . . . Farming methods have undergone big changes during the last few years. The requirements of a profitable investment in farm land have changed with them. Many farms are not good investments for absentee owners . . . Avoid mistakes and pitfalls through the Doane Farm Buying Service. Write for information about this service, and for a copy of

FREE QUESTIONNAIRE

which will help you in getting the type of farm best suited to your purposes in farm ownership. (Note: We do not accept a commission on the sale or purchase of a farm.)

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The Doane organization has grown and expanded on its record of satisfactory service in the management of many thousands of acres of agricultural land, for clients throughout the United States and Canada . . . The service includes:

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3. FARM PROBLEM STUDIES: *Consultation and studies on any specific farm enterprise or problem.*
4. FARMSTEAD WORK SIMPLIFICATION PLANNING: *Studies for reducing labor and for increasing production by re-arrangement or remodeling of farm buildings, use of labor-saving equipment, and time studies.*
5. APPRAISING: *Farms, improvements, crops and livestock appraised for buyers, sellers, partitions, tax assessment, condemnation and other purposes. Long time earning as well as current market value determined.*
6. ESTATE PLANNING *and management for rural properties and businesses.*
7. DOANE AGRICULTURAL DIGEST: *A complete agricultural information service for farmers, businessmen, farm leaders and teachers. For $10.00 a year you can get information prepared for the guidance of the Doane Farm Management Staff. (See advertisement elsewhere in this issue.)*
8. FARM BUILDING PLANS: *Doane revolutionary low-cost design saves construction labor, material, and farm labor through the life of the building. The buildings are tested on the farm, and fit practical farm management programs.*
9. AGRICULTURAL RESEARCH: *We serve as a connecting link between business and agriculture, doing research on products industry seeks to buy from or sell to farmers . . . Render counseling service to both large and small corporations and business firms, on specific problems or on an annual retainer basis . . . Engage in the procurement of specialized crops or livestock products . . . Assist in surveys, planning, production, designing, testing and advertising.*
10. "FARMING FOR PROFIT": *A monthly farm management letter for distribution by local business concerns, as a service to farmers . . . Also, a monthly column for county newspapers, and business or association publications, may be sponsored by local business concerns as advertising.*

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indicating by the numbers the subjects in which you are interested . . . No obligation, of course.

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parable price. The second method is somewhat more involved. Essentially it is to determine the income that the farm is capable of yielding and to capitalize this income into evaluation for the farm, that is, to determine the amount of capital at current interest rates it would take to produce this income. Usually both methods are used in arriving at a price.

The value of the first method depends on the number of farms that have been sold in the area and upon the accuracy of the comparison between the farm in question and those already sold. The accuracy of the second method depends on the correct choice of many variables. The first of these is an accurate estimate of the average yield; the second variable is the figure that shall be used as the value of the farm produce over the next several years; a third is the cost of producing the crop; and a fourth is the percentage figure that is used to determine the capitalization. The buyer, if he is normally cautious, will hold to a low estimate on yield and returns and a fairly high figure on cost and the returns he should get on his money.

When he figures the yield of an acre of corn, the buyer will not accept the owner's 81 bushel figure which was true for one year, but will take 56 bushels to the acre, a figure that more nearly represents the average for the last ten years. Figuring the cash value of the produce is more difficult. It appears now that with a growing population and with the government committed to heavy defense expenditures agricultural prices will remain high, but anyone who has ever looked at a graph showing farm prices from 1920 through 1921 knows how rapidly this picture can change. Anyone who can foretell these price trends with any accuracy would probably do better playing the grain market than he would farming. Since it is impossible to predict the exact price, most experts recommend using the average for the past ten years to keep on the conservative side.

Looking over the shoulder of a farm appraiser making a rather simple estimate on a 210 acre grain farm we can see this capitalization procedure put into effect. On this particular farm, 180 of the 210 acres are tillable the rest is a woodlot. The farm is operated on a three year rotation with a third of the acreage in corn, wheat, and hay each year. Since none of the trees in the woodlot are near harvest size, except for fence posts, this land is not classified as productive. Eventually, of course, these thirty acres will produce a salable crop, but they will add nothing to the farm income for many years. The appraiser therefore figures that 60 acres of corn with an average yield of 60 bushels to the acre will produce 3,600 bushels a year. He assigns a value of 90c a bushel to the corn, based on the average for the past ten years, which gives a total of $3,240 for the crop.

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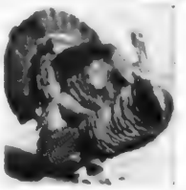

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The wheat yield he estimates at 22 bushels an acre for 60 acres which would produce 1,320 bushels. At $1.60 a bushel the wheat land would gross $2,112 a year. Alfalfa hay is estimated at one and three-quarters tons per acre or 105 tons for the year. At $18 a ton this would bring in $1,890 for the 60 acres of hay. The gross income from the three crops would be $7,242.

The expense of producing the crop is estimated by assuming that the farm will be tenant operated and deducting one-half the gross income as the tenant's share. Even if the owner is to be the operator, this is an easy way to estimate the cost of the major part of the labor and the machinery. This leaves $3,621 as the landlord's share of the gross income. His annual expenses are figured at: $350 for maintenance of buildings, fences, roads, etc.; $300 for owner supplied labor; $150 for the owner's share of fertilizer and lime; $190 for taxes; $150 for insurance; and $250 for seed. Subtracting the total expenses, $1,390, from the gross income leaves a net income of $2,231. This is the figure to be capitalized.

The appraiser capitalizes the income at seven per cent. His reason for using this figure is that it would cost five per cent to borrow the money with which to buy the farm and it is only safe to figure a two per cent spread for the protection of the owner. To find the amount of investment it would take to yield $2,231 at seven per cent he divides the income by seven and multiplies the dividend by 100. Performing this bit of simple figure juggling gives him a total valuation of $31,871 for the farm.

This is the total amount of money that can be invested in the farm and still produce a seven per cent income. If there are repairs needed on buildings or fences, they should be estimated and subtracted from this figure. If the owner were to be the operator and wants to find out how much he could afford to invest in machinery, he would take the tenants half of the gross income, subtract from it all of the tenants normal expenses such as labor, gasoline, power, etc., and capitalize the figure that remained. The cost of livestock would, of course, have to come out of the total valuation placed on the farm as a working unit.

This bit of figuring is the accepted, safe way to estimate the amount that can be paid for a farm, but it may result in a value that is too low to buy and equip the farm—the seller won't sell at this safe figure and the equipment costs are more than is allotted for this purpose. In this case the buyer must either give up the thought of buying at present prices or deliberately take a chance that his crop income will continue to rise for some time to come.

The price must, however, be geared to the income that will be made from the farm or the final adjustment of price to income will be made by the bankruptcy

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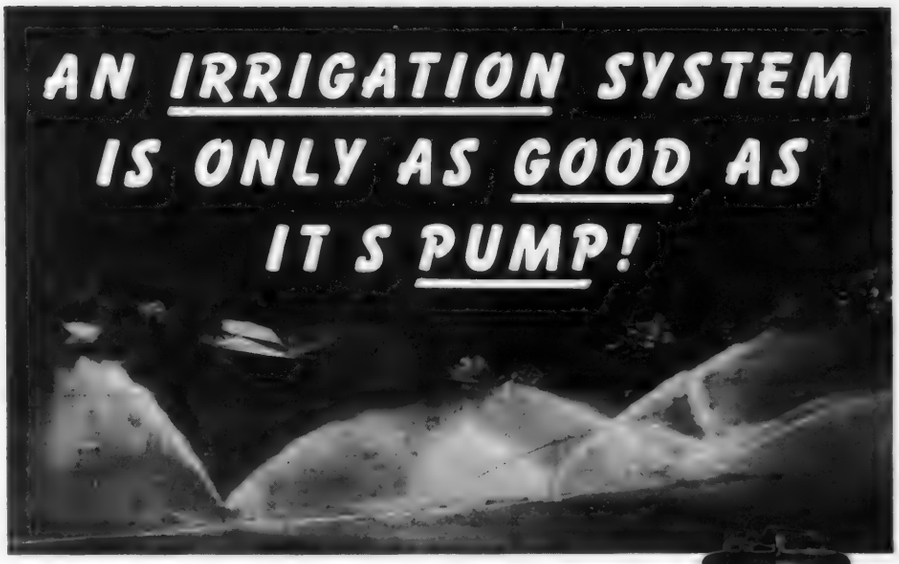

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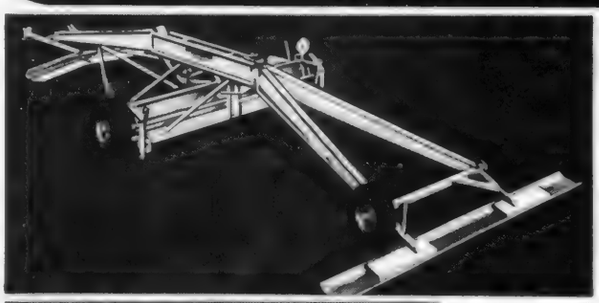

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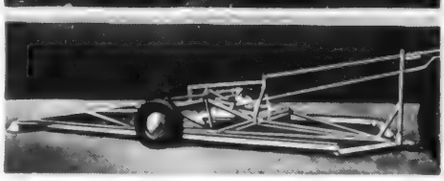

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court. An acre of ground in the city will have an extremely high value. It is close to a plentiful supply of electric power, a large labor group, and good transportation. It can be the site for a factory that will gross many millions each year. An acre of farm land that grosses $40 a year will be average, one that grosses $100 will be very good and $200 is exceptional. Another way of looking at it is to ask the question: how much rent can the land charge? Land that can support but one steer to four acres cannot demand the same returns as land that supports a steer to every acre and a half. Land that supports one dairy cow on an acre and a half cannot charge as much rent as a farm with irrigated pastures which will support a higher cow population. A dairy farm with its need for large pasture areas will not bring the same per acre return as a poultry farm with its thousands of birds on a single acre or a vegetable operation under glass. Land that can demand a high rent is worth a high price.

This method of appraisal looks at the farm as a working unit and gives no consideration for its site value. Land that is near a large city will have a value that has nothing to do with its ability to produce crops. This value, site value it is called, is given it by the pressure of population in the city which is growing toward it and which will eventually reach it and make it into expensive suburban property. This is a speculative value that has not been considered in the above appraisal.

Those farms that are to be owner operated will have to be equipped by the buyer. An indication of present costs can be had by comparing two sets of figures. Four years ago J. H. Sitterley, of the Department of Rural Economics at Ohio State University, worked out the cost of equipping a commercial family-sized farm. His figure for a full complement of machinery in 1946 was $7,232. Checking each piece of machinery against today's prices reveals that this same outfit would cost $13,392 today.

Since thousands of dollars and the hope of a lifetime are often involved in the purchase of a farm, a lawyer's fee is a small amount to pay for making sure that the buyer has all the protection of the law. The lawyer will make sure that both buyer and seller have a definite written understanding about all of the items of property that are being transferred by the sale. He will check the records to find if there has been any dispute as to the location of boundaries or fences. In highly sectionalized country a new survey is seldom made, but if disputes have existed as to the farm's boundaries or if only a portion of the farm is being sold the attorney will insist that the seller have the land surveyed. Some farmers have only a hazy notion of exact acreage in their own farms. He will check the title to make sure that it is free and unencumbered, that no unmentioned easements, liens, mortgages, or other encumbrances (heirs can be troublesome) are

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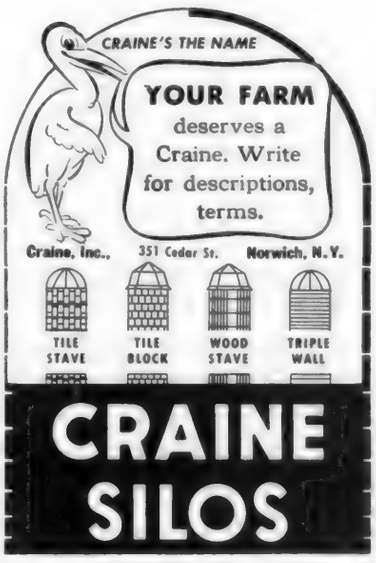

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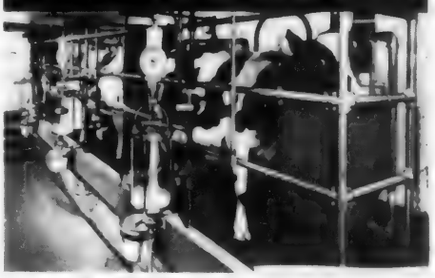

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outstanding against the property. His recommendation regarding title insurance should be secured and followed; in some states such insurance should be purchased, in others it is of less value because of local laws regarding termination of claims against property. The lawyer will make sure that there is an understanding about the payment of current taxes, the transfer of insurance, and that a date has been agreed upon for the buyer to take over.

Buying a farm, as was said before, is like getting married. There is an old saying that goes, "Who will have a handsome wife, let him choose her upon Saturday, and not upon Sunday, when she is in her fine clothes." And the man who would buy a farm prudently should avoid the spring when the worst farm in the world is clothed in beauty . . . but this is like telling a young man not to fall in love in April.

THE DAIRY BARN

(Continued from page 18)

These are large amounts. No. 187, the cow with the biggest yield, consumed close on 11,000 lbs. of concentrates besides beet, silage, hay, and grass—an average of 28-30 lbs. a day. On some days this cow ate as much as 40 lbs. of concentrates. The root feeds were sugar beet and carrots, and sugar-beet pulp.

The quantity of food consumed has been converted into food units (1 food unit—1,650 net calories, corresponding to 1½ lbs. starch equivalent), the number of food units of grass being estimated. The average number is given below, with an estimate of the number required for maintenance and growth. The difference should give the number available for milk production. A calculation has been made of the number of pounds of 4 per cent fat corrected milk which the cows yielded, both per food unit in the total food and per production food unit.

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Gain food units	285
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Pounds of 4 per cent fat corrected milk per food unit	3.64
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These figures are extremely interesting, especially when it is recalled that the extensive experiments that were carried out in the 1920's showed that the requirement of production food units was about one per 5.5 lbs. of 4 per cent fat corrected milk. In the present experiments from 5.10 to 5.44 was obtained, averaging 5.31 lbs.—or very nearly the same. Per food unit in total food the yield was 3.20 - 3.84 lbs. of 4 per cent fat corrected milk, averaging 3.64 lbs. This must be regarded as extremely satisfactory in view of the fact that the Danish milk recording societies achieved only 2.54 lbs. of 4 per cent fat corrected milk in the financial year 1947-

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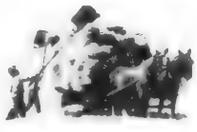

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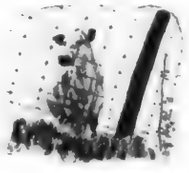

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48 and 2.67 lbs. in the best year, 1937-38.

On the whole, it may be said that the test cows at Stensbygaard were capable of a very high yield. They were able to consume a large amount of food, which they used to good effect. As a result, the ratio between the food units available for the production of milk and the actual yield achieved is only a small percentage below what could be expected from extensive tests. In relation to the total food the yield of these test cows was considerably greater than the average yielded by cows of the Danish milk recording societies. Thus the economic profit obtained from the test cows was good, even though more was spent on milking, tending, and general care than is normally spent.

The herd at Wedellsborg is an ordinary, good Danish estate herd. Good breeding bulls have been used on the farm for many years and the production of milk per cow has been about the same as at other manor farms, if considerably less than that of the pampered darlings at Stensbygaard.

In the period of winter feeding each cow was given a daily ration of about 60 lbs. of swedes (call them beets or turnips), 9 lbs. of hay, and 9 lbs. of silage from sugar-beet leaves. This is not a heavy amount of coarse fodder. But a good deal of concentrated food was used—on an average 35 lbs. per cow per day. A few cows consumed as much as 40 lbs. of concentrates a day. Formerly it was not thought possible to get cows to eat as much as this.

The cows soon showed their appreciation of good food and loving care. The daily yield continued to rise. While with normal feeding it had rarely been higher than 50 lbs. of milk, in the case of some of the cows it now reached 90 lbs. a day. Moreover it was exceptionally well maintained. Let us take cow No. 19 as an example. Twenty-six days after calving she gave 61 lbs. of 4 per cent milk a day. Ninety-six days after calving she gave 74 lbs. a day. The most remarkable fact, however, is that the same cow was still giving 60 lbs. a day 12 months after calving. So great persistency is very rarely met with, and then only when the cows are particularly well cared for.

Then came the year of the experiment with the extra good feeding and milking; the yield rose. It rose by 539 lbs. of butter per cow to 909 lbs. of butter fat a year, an increase was 146 per cent. In other words, in this record year, the cows gave about two-and-a-half times as much as they had given the previous years.

The question naturally arises whether it pays to spend so much on concentrated feed as was spent at Wedellsborg and Stensbygaard. At Wedellsborg, if the total feed cost is deducted from the receipts obtained from the milk, there is a net profit of $202.00 on each cow in the last 365 days. As an average cow under ordinary conditions does not even gross $202.00 worth of milk, it will be seen that the test cows yielded a handsome surplus.

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THE SAETERS

(Continued from page 45)

some districts pupils attend school every other day, applying what they learn in the school room to the tasks on the farms and fishing boats of their parents. Education tends to be practical rather than theoretical in Norway.

The highland farmer, isolated as he is and happily so little governed, nevertheless does not escape that burden of civilized man, taxes. He complains about them too, like his compatriots in Paris, New York, and Shanghai. In her restrained and gentle way, Kari Sande tells about her income and tax troubles. "The income on a mountain farm," she says, "is very small and the taxes quite heavy. On a farm like this, if a man and his wife work hard ten to fourteen hours a day, they should make about $750 a year. That was what my husband and I made the last year he was alive. Out of this we paid $150 for district and national taxes and $75 for old age insurance. We also had other taxes, in all about 35 per cent of our cash income. Of course, we had our living too."

"Farm workers, under a new minimum wage law, earn more than we make off the farm in a year. One can not afford to hire farm workers in Norway." Kari says in her precise, schoolbook English. "If we did we would lose money every day. That is why, even though we own our own farm, we must work 14 hours a day."

The Norway farmer has little for the bank after he buys his salt and coffee, pays his electric bill, and gives a little to the church. He must be eternally vigilant so that he has enough to eat and to wear, and fuel for his cooking and his comfort during the long northern winter. But this struggle for bare existence has developed one of the most admirable people of the earth. These blue eyed, fair haired people are welcomed all over the world as citizens.

Except for the rare discontented one, they love their bleak land more than the ease and comfort they might find in fairer climates. There will always be people to work the saeters of Norway.

THE AUTHOR: Jane Latta is a Pennsylvania farm girl. She attended the School of Industrial Art in Philadelphia and used what she learned there as a photographer for the O. W. I. during World War II. She writes on country life, mainly about the Amish and Pennsylvania Dutch. Last summer she and a girl friend rode bicycles through the Norwegian Saeter country.

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THE FARM QUARTERLY
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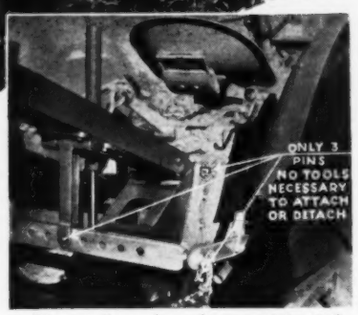
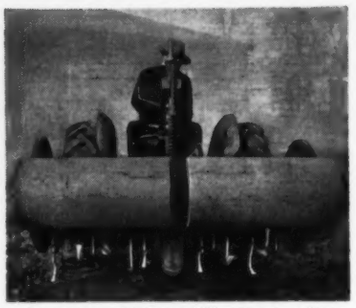
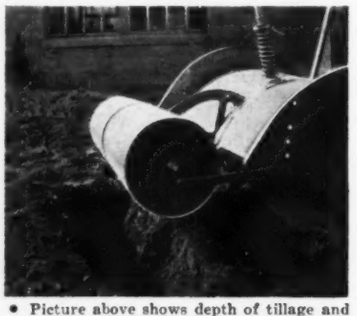


• Picture above shows how special attachment is made or detached through use of 3 pins inserted or removed by hand.

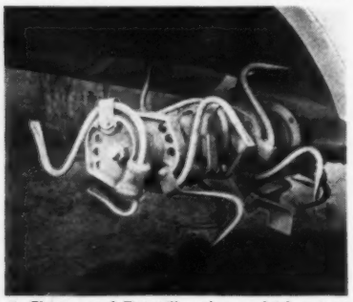


• Rear view. Notice width of cut, adjustable from 48 to 60 inches. Roller keeps depth of tillage uniform on uneven ground—smooths and compacts surface for easy planting.

• Picture above shows general compact appearance of tractor and Rototiller attachment raised by standard hydraulic lift to pass over roads or ground already prepared.



• Picture above shows depth of tillage and thoroughness of "mix" created. Depth ranges down to as deep as 9 inches below surface, depending on depth adjustment.



• Close-up of Rototiller tines, which rotate as tractor moves. Note especially patented Rotobuster that gives tillage under center housing—an exclusive feature.

• Shows the new Rototiller attachment at work, tilling 5-foot swath and turning under green manure ground cover. Plows, discs, and harrows all in ONE operation!

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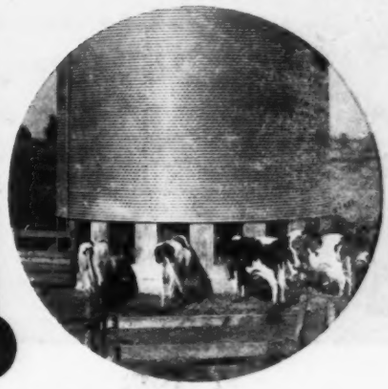

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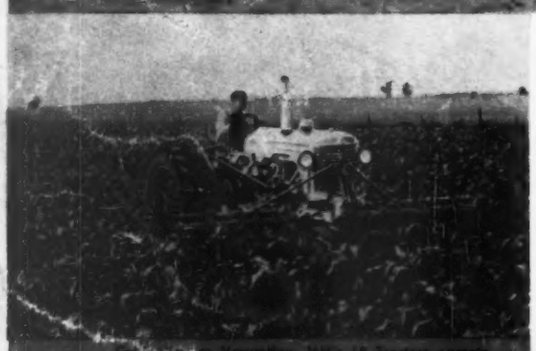
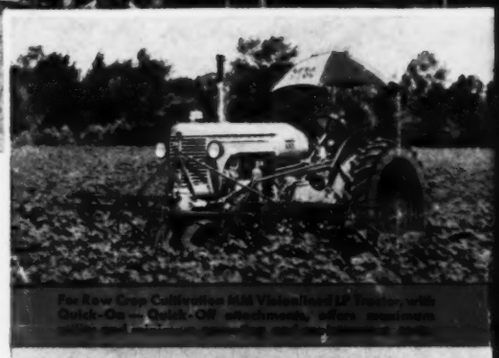
TO GIVE YOU ★MORE POWER ★GREATER ECONOMY





MINNEAPOLIS-MOLINE U TRACTOR, factory-built to use LP gas, gives you positive assurance of realizing all the advantages offered by LP gas fuel—butane or propane or a mixture of both . . . SMOOTHER PERFORMANCE . . . MORE POWER . . . GREATER ECONOMY!

MORE POWER OUTPUT—The high anti-knock rating of *100 octane plus fuel* permits a high compression ratio. Ask your dealer for facts. LP gas steps up the horsepower of the already powerful U about 10 per cent. Since MM factory-built LP gas tractors have high compression and *cold* manifolds, more power is realized and fuel consumption is cut to the very minimum.

EVEN LONGER ENGINE LIFE than usual on the already famous, long lived MM U tractor. Because LP gas is a dry gas it burns clean and eliminates carbon deposit and crankcase dilution . . . lubricating oil lasts several times as long due to less contamination, washing of lube oil from cylinder walls is eliminated and uniform bearing pressures are maintained because of the longer power impulse. Vibration is also lessened and the tractors run much cooler.

GREATER ECONOMY in maintenance costs is realized with all MM LP gas powered tractors and it is a fact that these tractors are great money savers, especially in areas where LP gas prices are favorable.

MM LP GAS TRACTORS ARE SAFE — Factory-equipped with special cylinder heads, special carburetors, and special tanks heavily built to resist pressure with a safety pop-off valve which meets the requirements of all states.

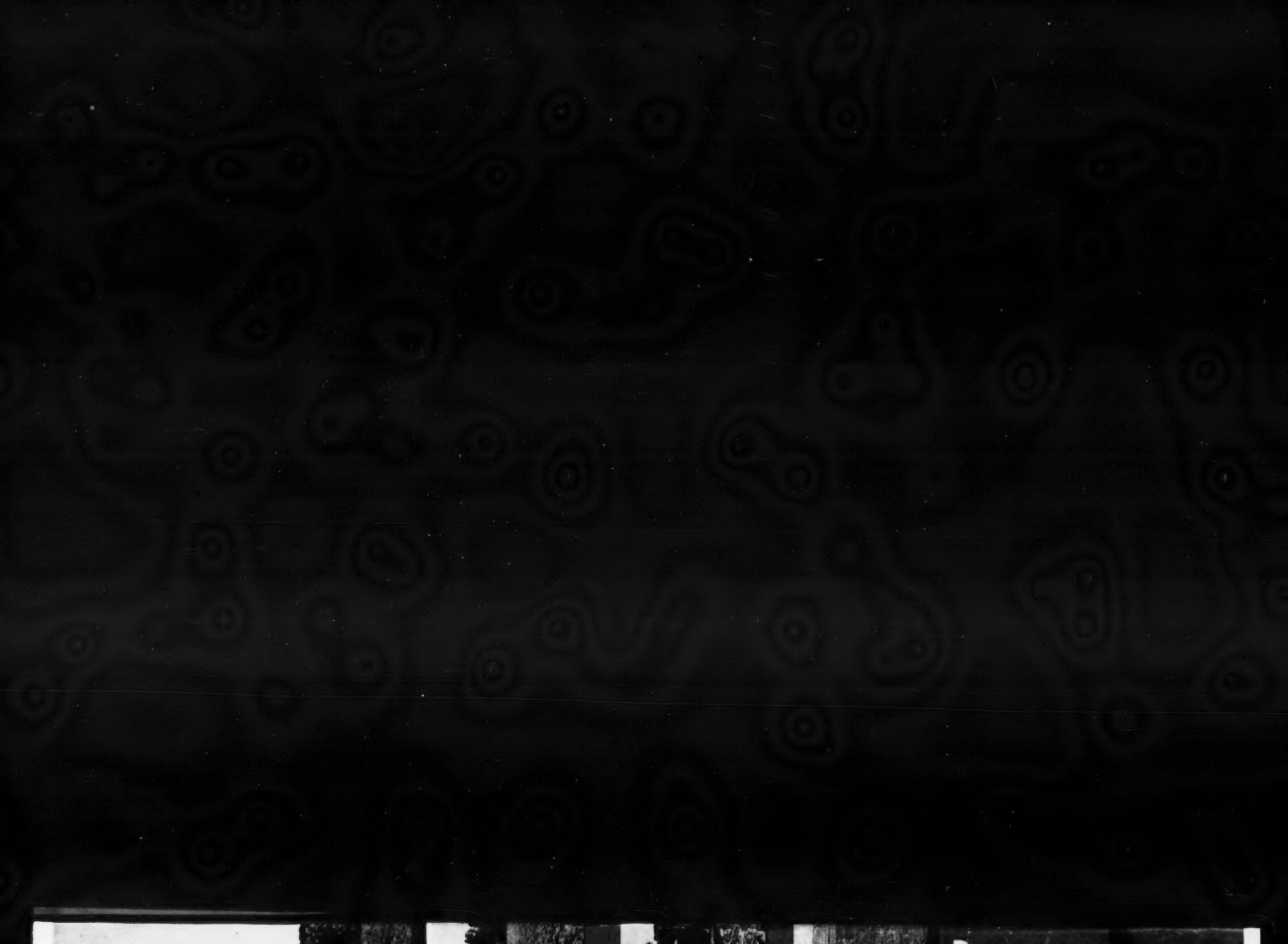
UNI-MATIC POWER is available as extra equipment and gives you smooth, accurate, hydraulic control of mounted or pull-behind tools. It features a double-acting jack with exclusive safety lockout, constant running engine-driven pump, and break-away couplings.

See your friendly MM dealer for the complete facts on MM LP gas tractors available in Universal and Standard models. Four kinds of power are available on these tractors: drawbar, power take-off, belt, and Uni-Matic. Ask your dealer or write us for additional literature on the *first factory-built LP gas tractors.*

MINNEAPOLIS-MOLINE
MODERN MACHINERY

Mighty Model "G"

FLASH!

Quality Control in MM Factories Assures Dependable Performance in the Field

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA